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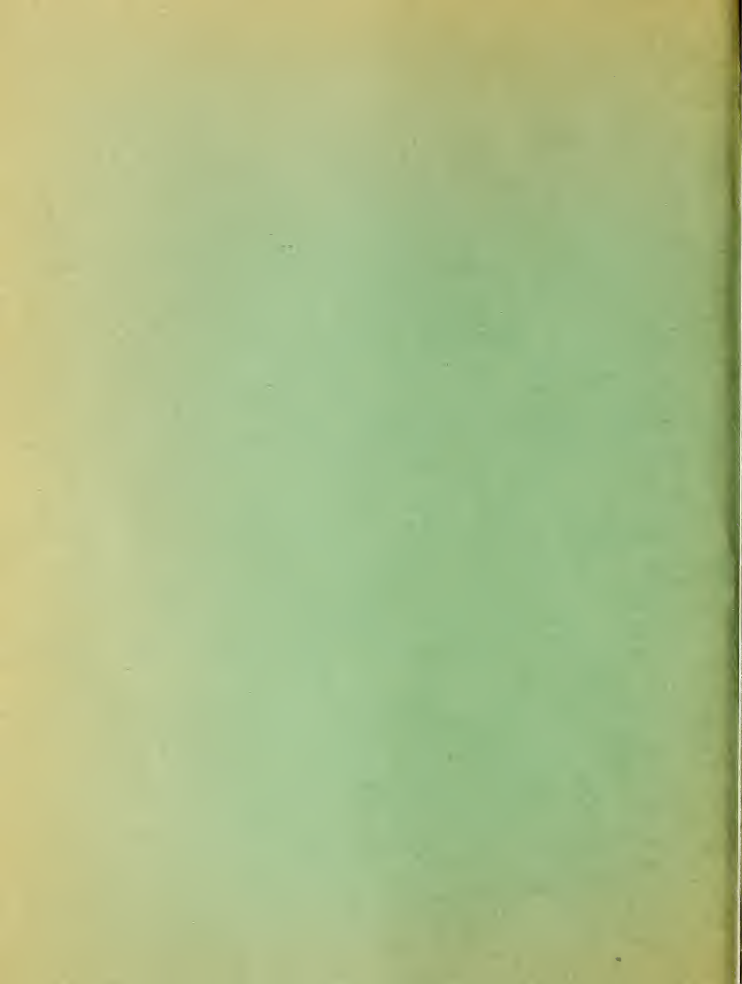
SOME IMPROVED METHODS OF HANDLING GROCERIES IN SELF-SERVICE RETAIL FOOD STORES



**UNITED STATES DEPARTMENT OF AGRICULTURE
PRODUCTION AND MARKETING ADMINISTRATION**

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The study on which this report is based was conducted under authority of the Agricultural Marketing Act (RMA Title II).

SUMMARY

The use of proper methods, equipment, and layout in receiving, checking in, price marking, and stocking groceries in the retail food stores studied increased productivity in these operations from 67 to 87 percent. About one-third of the total man-hours in these stores were spent in the handling of grocery department items (all items sold in retail food stores except fresh fruits and vegetables, fresh and frozen meats, and dairy products). The checking-out operation is not considered a part of the grocery-department operation and therefore was not included in this analysis. The four functions studied accounted for three-fourths of the total man-hour requirements of the grocery department. Motion- and time-study techniques were used to measure productivity on these functions as they were being performed before the study was made, and an attempt was then made to increase productivity in each function through the development of improved handling methods, equipment, and layout.

The most productive method of receiving involved the use of a minimum-size crew (2 men whenever possible: 1 man unloading the trailer, the second stacking cases in the storeroom), wheel-type gravity conveyors, and, to save checking-in and price-marking time, segregation of merchandise by commodity groups. The long, narrow, rectangular grocery storeroom was found to facilitate the most productive grocery handling because it permitted more precise commodity segregation and minimized the distance cases had to be carried by hand between the conveyor and merchandise stacks. In test stores in which these improvements were made, the average production per man-hour increased from 120 cases to 280 cases, an increase of 133 percent.

Checking the order in and unit pricing each case after the order had been stacked and segregated by commodity groups in the storeroom was the most productive method of performing these operations. Production per man-hour under improved methods was 506 cases as compared with 390 cases and 261 cases when former methods were used--increases of 30 and 94 percent respectively. The production of 390 cases was obtained when a 2-man crew checked the order after it had been stacked in the storeroom but in unsegregated stacks. The production of 261 cases resulted when 2 men were used to check the order as it was being unloaded from the truck. In all instances 1 man checked in the case, and the other wrote the unit price on the case.

The most productive price-marking system that was analyzed involved stamping the prices at the shelves on items that had been obtained from segregated commodity stacks in the storeroom. A self-inking price-marking set, attached to the handle end of each 4-wheel stocking truck, was used. Cases to be stocked on the bottom shelf were moved from the truck to the floor in front of the item location, opened, and price marked in this location. Cases that were to be stocked on the middle and top shelves were opened and price marked on the 4-wheel hand truck or on a leaf-type stocking shelf. Production per man-hour of 104 cases

was obtained when this method of price marking was followed (except that the 50-unit, price-marking set was used in place of the 13 percent more productive self-inking set).

Store layout and store policies influence the choice of price-marking systems. Some store operators prefer to perform the price-marking operation in the back room. Production increases in back-room price-marking operations were obtained primarily by drawing merchandise from segregated stacks in place of unsegregated stacks, using wheel-type roller conveyors in place of 2-wheel hand trucks, using price-marking sets in place of band-type stamps, and improving stamping procedures. These improvements resulted in a production of 96 cases per man-hour when the cases are cut in half, 93 cases by moving the flip-board table to merchandise stacks, 82 cases when price marking with the stationary flip-board table, and 72 cases when removing units from the top layer. Employing improved methods of price marking at the shelves and in the back room resulted in production increases ranging from 60 to 109 percent.

The highest production per man-hour for stocking shelves was obtained by the use of a leaf-type sliding shelf, installed as a part of each 3-foot section of display shelves to support the case of merchandise during the shelving operation, and by the use of 4-wheel hand trucks for carrying cases from the storeroom to the shelves. By using this equipment and improved methods, production per man-hour was 37 cases as compared with 23 cases when former methods and equipment were used. Thus it increased 61 percent.

The improved methods and equipment developed for the four functions covered by this study were tested in three stores, and resulted in productivity increases of 67, 71, and 87 percent.

SOME IMPROVED METHODS OF HANDLING GROCERIES IN SELF-
SERVICE RETAIL FOOD STORES 1/

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INTRODUCTION

The 515,000 retail food stores in the United States play an important role in our economy. In 1950, according to trade estimates, their combined sales were 33 billion dollars. 2/ It is in these stores that the consumer decides whether or not he will buy the products of the farmer and the food processor and how much he will buy. Furthermore, any reductions that can be made in the cost of handling foods in retail stores benefit not only the retailer but also the farmer and the consumer.

Fifty percent of the total sales of food stores consisted of "grocery" items which, in this report, include all items sold in the retail food store except fresh and frozen meats, fresh fruits and vegetables, and dairy items. The handling of grocery department items (excluding the check-out operation) represents about one-third of the total store man-hours. Three-fourths of the total grocery department man-hours are required for the four functions of receiving, checking-in, price-marking, and shelf-stocking merchandise that are dealt with in this report.

Although great changes have occurred in food retailing during the last 20 years, as evidenced in the modern self-service supermarket, techniques for moving merchandise from the loaded motortruck to the shelf have not kept pace with other advances. Therefore, this study was made to evaluate the grocery handling operation to determine the advantages and disadvantages of the more common methods and equipment in use, as well as to develop improved methods, equipment, and layout that would increase labor productivity.

The methods and equipment used in 60 stores of two retail food chains located in various sections of the country were examined before detailed studies were begun. Average weekly total sales of each of these stores ranged from \$4,000 to \$100,000. From these 60 stores 10 of them were selected for detailed study.

1/ This is the second report in a series on handling operations in retail food stores. The first report, "The Check-out Operation in Self-service Retail Food Stores," by E. M. Harwell and Paul F. Shaffer, agricultural marketing specialists, Production and Marketing Administration, published in January 1951, was an analysis of the check-out operation.

2/ Facts in Food and Grocery Distribution as of January 1951--The Progressive Grocer.

Before work was started in these stores the purpose and plan of the study was explained to store personnel. The use of the stop watch was explained. The necessity for the operator to perform at his usual pace while being time-studied was stressed. The objective of making the job easier for the employee was emphasized. Employee suggestions and criticisms were welcomed, and when improved equipment was designed the employee took a part in the developmental work.

Process charts and flow diagrams were used to analyze each grocery operation as typically performed. Each function was broken down into its detailed component parts, called elements. Each element was then timed for a large number of successive cycles to determine the time required to perform the various parts of the job. The operation was analyzed in detail to determine whether improvements could be made by eliminating, combining, changing the sequence, or by simplifying the various elements in the operation through the application of the principles of motion economy. Improved methods, work place arrangement, and layout were designed and in some instances new equipment was installed. Employees were then trained in the use of improved methods, equipment, and layout, and time studies were repeated to determine the effect of the improvements on productivity. The improvements were then installed and tested in other retail stores.

In each time study the stop-watch readings for each element were averaged and these average times were used as the basis for developing performance figures for the operation. A rating factor was applied to the average elemental times for each operator studied, this factor being based on the effective speed at which the operator worked. Skill was not considered to be a factor in individual performance since it was defined for the purpose of this study as the ability of the individual to follow a given motion pattern. ^{3/} Thus, with the method standardized, speed alone controlled variations in elemental times between trained operators. The rating factor was applied to the average time for each element in order to convert actual performance of the operator studied to expected performance by the average operator working with a standardized method. A fatigue and personal allowance factor of 15 percent was applied to the sum of the various elements for each study. ^{4/} Avoidable delays on the part of the operator were excluded from the standards. Operator delay time caused by customer interference was excluded.

Time studies were taken on each type of equipment for each method of operation and on crews of various sizes to determine the basic time

^{3/} Ralph Presgrave, The Dynamics of Time Study, 1945.

^{4/} The selection of the 15 percent figure was based on the Personal and Fatigue Allowance Table, p.370, Motion and Time Study, by Dr. Ralph M. Barnes, New York, 1949.

required to perform each of the various elements in the operation and the frequency with which each of these elements occurred. Production standards were developed from these data to show production per hour and production per man-hour. 5/

5/ For detailed standards of all equipment studied see Appendix.

UNLOADING THE GROCERY ORDER

In the grocery receiving operation of a retail food store the principal problem concerned material handling. The productivity of this operation for any store depended on the store layout, the equipment and the methods used, and the number of persons employed in unloading the truck. The operation was first analyzed in 18 stores of a midwest branch of a major food chain. Detailed studies were made in 3 pilot stores selected because each was representative of different layouts, methods, equipment, and crew sizes.

The Unloading Operation in Three Stores Before Improvements Were Made

Store 1.--The grocery order was delivered in a trailer to the storeroom door at the rear of the building. The building did not have an unloading platform. Only the cases in the rear of the trailer were unloaded through the rear door of the trailer; most of the merchandise was unloaded at the trailer side door. A 5-man crew was employed in the receiving operation (fig. 1). The No. 1 man obtained the merchandise from the stacks in the trailer and placed it on the trailer floor near either the rear or side doorway. The No. 2 man picked up the case off the trailer floor and placed it in a stack on the ground. When the stack was of sufficient size to constitute a load for a 2-wheel hand truck (fig. 2), the No. 2 man helped position the load on the hand truck. The No. 3 and No. 4 men transported the merchandise from the trailer into the storeroom. The No. 5 man helped remove the merchandise from the hand truck and placed the cases in stacks (6 to 8 feet high) along the wall and, when necessary, in a row parallel to and approximately 4 feet from the wall. Cases were stacked as received on the hand trucks except that the No. 5 man attempted to place heavy items on the bottom and light or fragile items on top of the stacks. The grocery order was unloaded at the rate of 94 cases per man-hour.

Store 2.--This store had two ground levels. The store proper opened on the street level whereas the large basement storeroom was on the ground level in the rear (fig. 3). A "one-way" belt conveyor was employed to elevate the merchandise from stacks in the basement to the sales floor. An unloading platform, approximately the same height as the trailer floor, was located at the receiving door. A 2-man crew unloaded the trailer. The No. 1 man obtained the case from a stack in the trailer and placed it on the trailer floor in a stack. The No. 2 man pushed the 2-wheel hand truck into the trailer through the rear door and loaded a stack of cases, assisted by No. 1. He then wheeled the hand truck into the storeroom and dropped the loads in parallel rows. The production for this operation was 225 cases per man-hour.

Store 3.--The storeroom for this store had a limited area in the rear allocated for grocery storage (fig. 4). The store did not have an

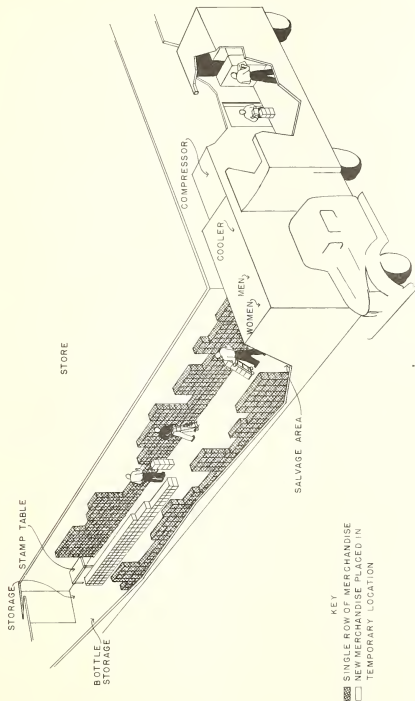


Figure 1.--Former receiving operation for store No. 1--5-man operation.



Figure 2.--The 2-wheel hand truck typically used in the retail food store.

unloading platform. A 2-man crew was used in the receiving operation. The No. 1 man obtained the merchandise from the stacks in the trailer and placed it on the trailer floor at either side or rear door, as at store No. 1. The No. 2 man obtained the case from the trailer floor and placed it on a 2-wheel hand truck which, when loaded, he wheeled to the storeroom. The initial loads were dropped in rows. As space became limited he placed Cases on top of the stacks. Bulky cases were placed along the wall in a permanent location or placed on 4-wheel hand trucks for hauling to the store proper by stock clerks. The 2-man crew unloaded the grocery order at the rate of 147 cases per man-hour.

A comparison of the productivity of the three stores (table 1) revealed that store No. 2 had the best receiving operation because the hand truck could be wheeled into the trailer and loaded, and because the storeroom was large enough to drop the loads without restacking.

Table 1.--Productivity in the receiving operation, using the 2-wheel hand trucks, in 3 retail food stores 1/

Store No.	Size of crew	Man-minutes per case	Cases per hour	Cases per man-hour	Man-hours per 1,000 cases
	Number	Number	Number	Number	Number
1	5	0.6394	470	94	10.6
2	2	.2668	450	225	4.4
3	2	.4073	294	147	6.8

1/ For details of production standards, see Appendix, tables 18, 19, and 20.

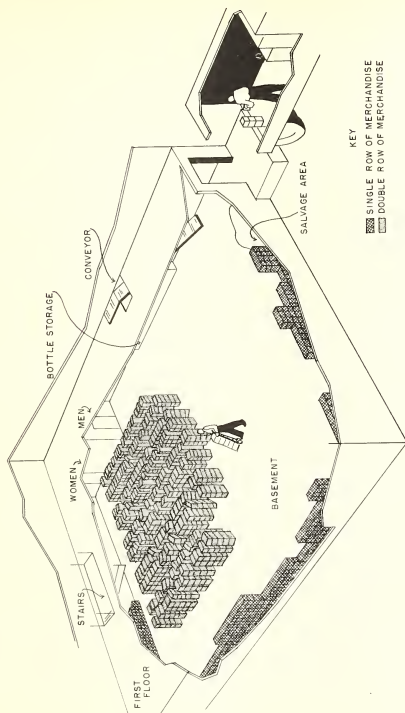


Figure 3.--Former receiving operation for store No. 2--2-man operation.

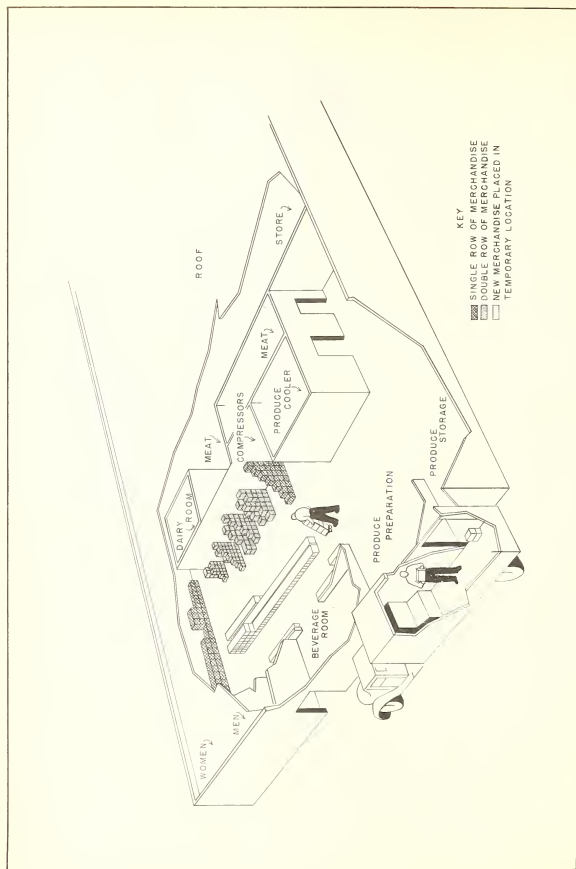


Figure 4.--Former receiving operation for store No. 3--2-man operation.

The Unloading Operation in Three Stores after the
Installation of Wheel-Type Gravity Conveyors

Methods analysis of the receiving operation in the test stores indicated that the proper installation and the proper use of wheel-type gravity conveyors would result in improved productivity. 6/ Conveyor equipment was installed in the three stores. Building alterations were necessary for stores Nos. 1 and 3. In these stores windows were cut in the building in order to provide direct access from the loaded truck to the grocery storage area. Straight-line conveyors were the only type used. In store No. 3 it was possible to locate the receiving window at a point that permitted unloading from the rear door of the trailer. The alterations and the layout of the storerooms are shown in figures 5, 6, and 7. After conveyor installations were made, the average production per man-hour for these 3 stores increased 198 percent, 49 percent, and 128 percent respectively (table 2).

Table 2.—Productivity of the receiving operation and savings through the use of wheel-type conveyors, in 3 retail food stores 1/

Store No.	Size of crew	Cases per hour	Cases per man-hour	Man-hour per 1,000 cases	Savings in man-hours per 1,000 cases	Increase in man-hour production
				Former 2/	Improved 2/	3/
	Number	Number	Number	Number	Number	Percent
1	2-1/3	652	280	10.6	3.6	198
2	2	670	335	4.4	3.0	49
3	2	670	335	6.8	3.0	128

1/ For details of production standards refer to Appendix tables 21 and 22.

2/ The 2-wheel hand truck was used exclusively.

3/ This represented savings in the receiving operation only.

4/ A third man was added to the receiving crew to help unload the nose and rear sections of the trailer (approximately one-third of the cases).

Where possible the conveyors were installed in a straight line. The unloading operation consisted of two basic steps: (1) Obtaining and positioning case on conveyor, and (2) removing case from conveyor and stacking (fig. 8). Except for store No. 1, the conveyor was installed through the rear door

6/ Henceforth any reference to conveyor shall be construed to mean "wheel-type gravity conveyor" unless otherwise specified.

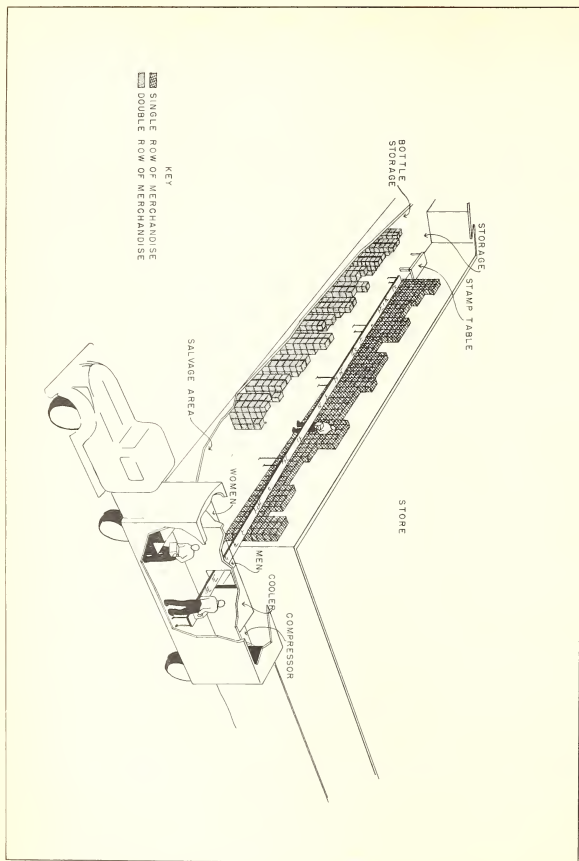


Figure 5.--Improved receiving operation for store No. 1--2-1/3-man operation.

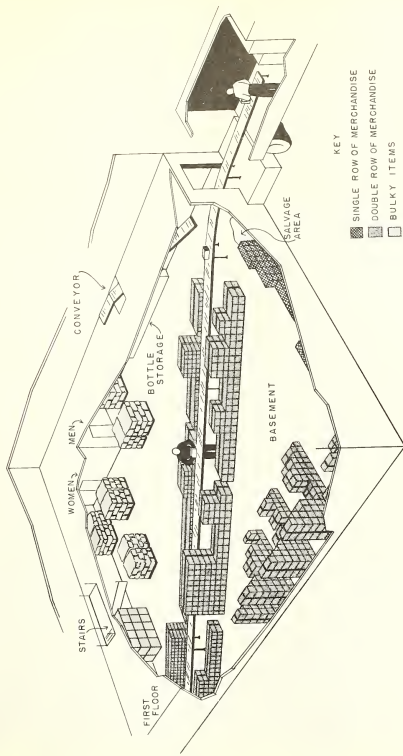


Figure 6.--Improved receiving operation for store No. 2--2-man operation.

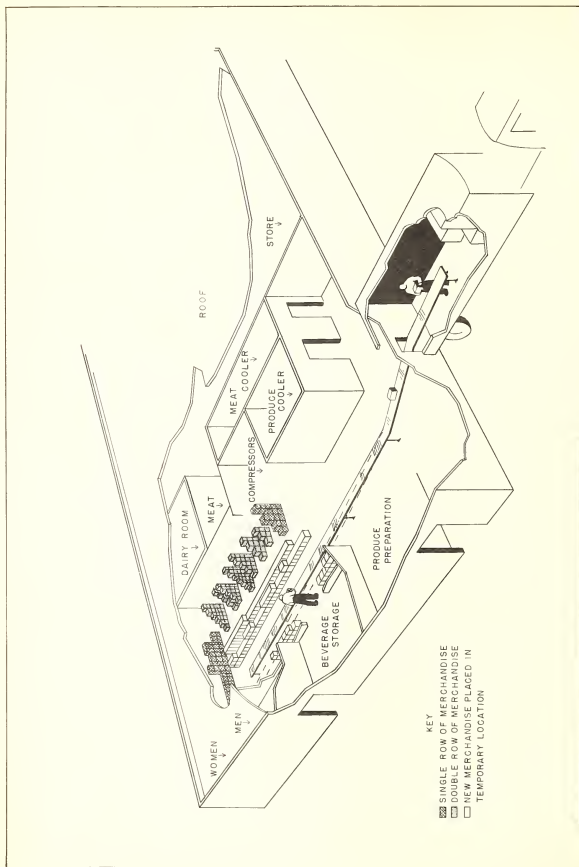


Figure 7.--Improved receiving operation for store No. 3--2-man operation.

of the trailer. This resulted in the best productivity since additional conveyor lengths could be added as the unloading progressed, thus reducing the walking distance for the person in the trailer. Whenever it was necessary to unload from the side door of the trailer it was advisable to have an employee help obtain those cases in the rear or in the nose of the trailer.

In order to evaluate the conveyor used for the receiving of grocery items in its over-all perspective it is necessary to consider the advantages it brought about in other grocery department operations. The stores realized additional savings by using the conveyor equipment to obtain merchandise for price-marking and stocking operations, as indicated in the section beginning on page 32. Based on 1,000 cases (and with the



Figure 8.--Removing the cases from the conveyor in the grocery storeroom. This may be a 1- or 2-man operation, depending on the crew organization.

merchandise in the storeroom in commodity group sections), these savings from use of the conveyor in price-marking and stocking operations were 4.1 man-hours at store No. 1, 3.1 man-hours at store No. 2, and 1.2 man-hours at store No. 3. The cost and the returns from the conveyor in installations are shown in table 3.

The Unloading Operation in Five Additional Stores

Conveyor equipment was installed in five additional stores where time studies and methods analyses indicated possibilities for similar savings. Production before and after installation, labor savings, and time required to pay for equipment costs out of labor savings are shown in table 4. In each of the five stores it is estimated that the labor savings from the receiving operations alone would pay for the equipment in less than a year.

The Effect of Conveyor Installations on Truck Tie-up Time

Another important saving that resulted from the conveyor installations was a reduction in truck tie-up time. The more time required at the store to unload the grocery order the more equipment was required by the transportation department to supply the stores. The use of conveyors for unloading at these eight stores reduced the truck tie-up time by from 29 to 69 percent (table 5).

Installing the Conveyor to Receive the Grocery Order

By properly installing the conveyor and training store personnel in its use, it was possible to unload 98 percent of the grocery order on the conveyor. The first essential in installing the conveyor was the provision for sufficient pitch to permit the cases to roll freely. For the majority of grocery items a drop of 4 to 6 inches per 10 feet of conveyor was satisfactory for its entire run without the use of a booster. 7/ Where there was insufficient pitch, the cases would not roll freely and another person had to be added to the crew to keep the cases moving, or the stacker had to walk to the point where the case stopped and give it a push. In either instance unloading costs rose with a proportional decrease in man-hour production.

The most productive conveyor installation, and the one best used by store personnel, was the simplest. In most stores the conveyor was installed in a straight line. Curve sections were used successfully in several stores, but they required more pitch than the straight sections and were more difficult to support. In addition, extra large cases would not turn the curve owing to interference with the protecting rail.

7/ The conveyor used was 12 inches wide, with 10 wheels per lineal foot. Where there is insufficient fall available in a store the pitch can be reduced by using a conveyor with 12 wheels per lineal foot (fig. 8).

Table 3.--Cost of conveyor installations, labor savings, and number of weeks required to pay for the installations in 3 retail food stores

Store: No.	Cost of:		Man-hour savings per 1,000 cases		Total man-hour savings		Savings in wages:		Savings: per week		Weeks required to pay for	
	building:	instal- lation	Price- marking	Receiving: operation	marking and stocking	operations	Number	Number	per 1,000 cases	1/ week	out of labor	savings Number
	Dollars:	Dollars:	Number	Number	Number	Number	Number	Dollars:	Dollars:			
1	140	238	7.0	4.1	11.1	12.21	17.09	22				
2	-	204	1.4	3.1	4.5	4.95	6.44	32				
3	91	179	3.8	1.2	5.0	5.50	4.68	58				

1/ Based on \$1.10 average hourly wage; savings per week for 1,400 cases at No. 1, 1,300 at No. 2, and 850 at No. 3 stores.

Table 4.--Comparative productivity in the receiving operation before and after installation of conveyor equipment, and savings through use of conveyors, in 5 retail food stores 1/

Store No.	Production										Savings		
	2-wheel hand trucks					Wheel-type gravity conveyor					Man-hours		2/
	Size : Cases	Man-hours : of per 1,000 :	Size : Cases	Man-hours : per 1,000 :	Per : cases :	Size : Cases	Man-hours : per 1,000 :	Per : cases :	Per : cases :	Per : cases :	Cost of		weeks required
	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	of : per 1,000 :	conveyor : installation :		to pay for equipment 3/
	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	1 number : Number :	Dollars :		Number :
4 :	4/ 4 :	103 :	9.7 :	5/ 3 :	256 :	3.9 :	5.8 :	4.9 :	186 :	34 :			
5 :	6/ 3 :	135 :	7.4 :	2-1/3 :	280 :	3.6 :	3.8 :	5.3 :	119 :	20 :			
6 :	7/ 5 :	77 :	13.0 :	8/ 4 :	209 :	4.8 :	8.2 :	13.1 :	212 :	15 :			
7 :	7/ 5 :	74 :	13.5 :	8/ 4 :	209 :	4.8 :	8.7 :	19.1 :	314 :	16 :			
8 :	9/ 2 :	105 :	9.5 :	2 :	335 :	3.0 :	6.5 :	6.5 :	10/ 246 :	34 :			

1/ For details of production standards refer to Appendix tables 21, 22, 23, and 24.

2/ These savings related to the receiving operation only. As in the case of stores Nos. 1, 2, and 3, additional savings were realized through proper use of the conveyor in the stamping operation.

3/ Based on average wages of \$1.10 per hour and for 850 cases per week at store No. 4, 1,400 at store No. 5, 1,600 at store No. 6, 2,200 at store No. 7, and 1,000 at store No. 8.

4/ Crew organization: 1 man in trailer, 1 man on ground at trailer door, and 2 men hauled cases to storeroom on 2-wheel hand trucks.

5/ For details on composition of 3-man crew see p. 18.

6/ Crew organization: 1 man in trailer, 1 man on ground at trailer door, and 1 man hauling with 2-wheel hand truck.

7/ Crew organization same as store No. 1, described on p. 4.

8/ In this store the 2 truckers were assigned to the truck and labor agreements prohibited their working in the storeroom; therefore, 2 store employees were used to remove the cases from the conveyor. The trailer was unloaded from the side door.

9/ Crew organization: 1 man placed cases in stacks at trailer door, dismounted, and took the cases from floor at trailer door and placed on ground. The second man obtained the case from the ground and carried it down 3 steps and into storeroom where it was placed in stack. When stack was of sufficient size, he moved them to storeroom location with 2-wheel hand truck.

10/ Includes cost of necessary building alterations (\$125).

Table 5.--Comparison of truck tie-up time in the grocery-receiving operation before and after conveyor equipment was installed in 8 retail food stores

Store No.	Before			After			Percent decrease in truck tie-up time
	Size of crew	Cases per hour	Hours per 1,000 cases	Size of crew	Cases per hour	Hours per 1,000 cases	
	Number	Number	Number	Number	Number	Number	Percent
1	5	470	2.1	2-1/3	652	1.5	29
2	2	450	2.2	2	670	1.5	32
3	2	294	3.4	2	670	1.5	56
4	4	412	2.4	3	774	1.3	46
5	3	405	2.5	2-1/3	652	1.5	40
6	5	385	2.6	4	835	1.2	54
7	5	370	2.7	4	836	1.2	56
8	2	210	4.8	2	670	1.5	69

Conventional adjustable conveyor stands were used in each store. It was important that the installation not interfere with the flow of traffic in the storeroom. When the conveyor blocked doors or the normal traffic pattern, the employees would dismantle it after each grocery order was unloaded. This decreased its over-all effectiveness for its use in the stamping operation. The conveyor properly utilized in the stamping operation (this is discussed in a later chapter) resulted in considerable savings in man-hours.

As important as proper installation was proper conveyor use--placing the cases on the conveyor in the trailer and taking them off in the storeroom. The momentum gained by the case when it was moved from the stacks in the trailer to the conveyor was used to start the case down the conveyor. This was especially important where the pitch of the conveyor was not as great as desirable. Similarly, the momentum of the case was utilized when the stacker in the storeroom took it off the conveyor--the stacker turning in the direction the case was moving (fig. 8).

In one store, where there was insufficient pitch available, a belt conveyor was installed to elevate the cases to a height of 6 feet, from which height they moved down the wheel-type gravity conveyor. The cases were placed on the gravity conveyor in the truck and moved to the booster belt conveyor just inside the storeroom door. The cases were elevated by belt and then moved down the side of a long storeroom on the gravity conveyor (fig. 9). The cost of the total conveyor installation was paid for in 52



Figure 9.--Belt conveyor used to elevate cases to a height of 6 feet, from which elevation they moved down the wheel-type gravity conveyor.

weeks out of labor savings in the receiving operation alone. Additional savings were obtained through use of the conveyor in the price-marking operation.

Determining the Proper Crew Size for the Grocery-Receiving Operation

A large number of store managers in various sections of the country felt that receiving efficiency was directly proportional to the number of employees assigned to the unloading crew. The receiving studies revealed that production per man-hour generally decreased rapidly (with resulting increased costs) with an increase in crew size above 2 men. This is evidenced in the original comparison between stores Nos. 3 and 6. At the former, a 2-man crew unloaded 294 cases per hour, whereas, at No. 6, a 5-man crew unloaded 385 cases per hour. Obviously, production was higher at store No. 6; however, 6.8 man-hours were required to unload 1,000 cases at store No. 3, and 13.0 man-hours at store No. 6; that is, 91 percent more labor was used at store No. 6.

When the grocery order was unloaded by conveyor the 2-man crew was the most efficient crew arrangement. As indicated in table 6, the production per man-hour was 335 cases for the 2-man crew—60 percent more than for the 4-man crew. A 2-1/3-man crew was advantageous when the physical layout forced the use of the trailer side door for unloading and an extra man was added to the crew for approximately one-third of the unloading operation.

The 3-man crew was used when the merchandise was segregated by commodity groups and stacked on both sides of the conveyor in the storeroom. One man working alone on the storeroom could not keep up with the man in the trailer because he frequently had to cross the

Table 6.—Comparative production for different crew sizes in unloading the grocery order using conveyors in retail food stores

Size of crew (Number)	:	Cases per hour	:	Cases per man-hour
	:	<u>Number</u>	:	<u>Number</u>
2-man	1/	670		335
2-1/3 man	2/	652		280
3-man	3/	774		258
4-man	4/	836		209

1/ For details of production standard see Appendix, table 21.

2/ For details of production standard see Appendix, table 22.

3/ For details of production standard see Appendix, table 23.

4/ For details of production standard see Appendix, table 24.

conveyor to place merchandise in its proper commodity group section. An extra man (fig. 8) was added to help stack the order, one person working on each side of the conveyor. In this instance, the man in the truck improved the operation by placing on the conveyor, whenever possible, alternate cases of different commodity groups of merchandise.

The 4-man crew was used only when two persons were, because of labor union requirements, assigned to the truck. One person in the storeroom could not keep up with them. The 4-man crew was not recommended because of the drop in productivity.

As the size of the crew was increased production in cases handled per hour increased, except for the 2-1/3-man crew 8/ which, in effect, was a variation of the 2-man crew. The percentage change in production from the 2-man crew was as follows:

<u>Size of crew</u>	<u>Production increase or decrease in cases handled per hour</u>
2-1/3-man	3 percent (decrease)
3-man	16 percent (increase)
4-man	25 percent (increase)

8/ The reason production in cases per hour for the 2-1/3-man crew was less than for the 2-man crew was that in the latter instance the man in the trailer did not have to walk from the front or rear of the trailer to reach the conveyor. Additional conveyors were installed as the unloading progressed. For the 2-1/3-man crew, the conveyor was installed in the side door and as the operator worked toward the rear or the nose of the trailer the walking time per case increased.

At the same time the cost of unloading increased as follows:

<u>Size of crew</u>	<u>Cost increase over 2-man crew</u>
2-1/3-man	20 percent
3-man	30 percent
4-man	60 percent

Locating the Merchandise in the Storeroom

In many instances the store manager rounded up all available help for the unloading operation and directed them to unload the truck or trailer in the least possible time. A premium was placed on the length of time required to empty the truck. As a result the grocery order was frequently stacked helter-skelter in the storeroom. When the order was received after store hours and stacked in the storeroom or lobby by transportation personnel, it frequently was poorly stacked. 9/ As previously mentioned, the manner in which the order was stacked had an important effect on time requirement and the ease with which subsequent grocery operations were performed. The merchandise arrangement in the storeroom was determined by (1) whether the order was stacked in a temporary location or moved to a permanent location as it was unloaded, (2) the degree of commodity group segregation desired, and (3) the layout of the storeroom.

Disposing of the Case from the Conveyor

When the operator (or operators) removed the case from the conveyor as the grocery order was unloaded he had a choice of stacking it in a temporary location convenient to the conveyor (fig. 10-A) or of carrying it to the permanent stock location for the particular item (fig 10-B). Frequently bulky items, such as cereal, flour, and paper products, were placed on a hand truck and moved directly to the sales floor. The time required to place the case in a temporary location (with no attempt at commodity group segregation) averaged 0.0690 minute per case and varied little from store to store. When the case was moved to a permanent location the time required per case was 0.135 minute in one store and 0.160 minute in another. The time varied according to the distance from the conveyor to the stack location.

Whether the order was placed in a temporary or a permanent location depended on available storage space and the methods of processing the order. If sufficient space was available for all grocery items along

9/ Many retail food stores had a small enclosed room just inside the grocery receiving door. This room, called lobby or tent, was locked off from the remainder of the building, and was used only for storage of grocery orders that were delivered during hours the store was closed.

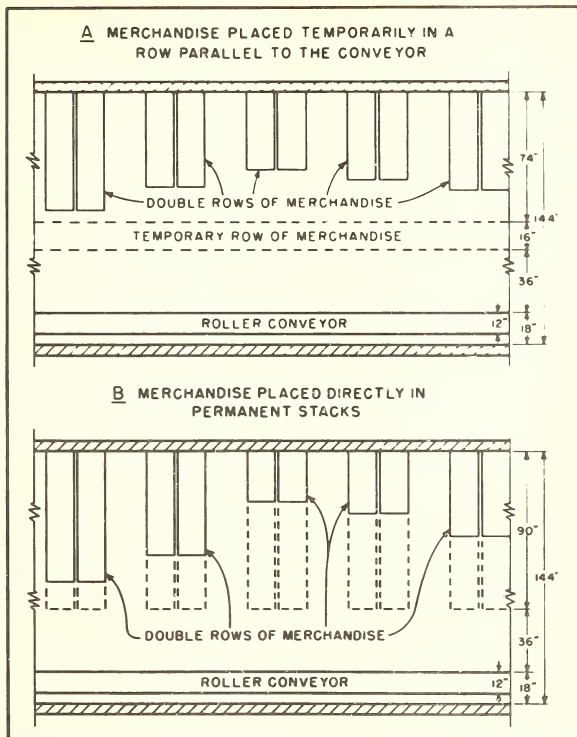


Figure 10.--Alternative methods of stacking the grocery order in the storeroom of a retail food store.

the conveyor, considerable walking and carrying were eliminated by stacking the merchandise in a temporary row along the conveyor. Also, if the order was checked in and stamped immediately after being unloaded it was desirable to have it stacked in a temporary row along the conveyor. This procedure was found to be advisable only when most of the order could be stamped and placed on the shelves immediately upon receipt. In most of the stores studied, the merchandise comprising the grocery order was ordered to fill expected depleted shelves when the order arrived at the store. However, when merchandise was ordered to replace depleted storeroom stocks, and merchandise was stamped only as it was needed at the shelf, it was found best to place the cases immediately in their permanent location. Then the merchandise was not in the way during the period prior to the delivery of the next order.

In stores where items received were checked with the invoice after the order was unloaded and placed in a permanent location, there was the problem of identification when the new merchandise was stacked with the old. This was remedied either by placing an "X" on the top case of every stack or placing a line down each of the old stacks just before the incoming order was unloaded.

Segregating the Order by Commodity Groups

Commodity group segregation in the storeroom was obtained by placing merchandise in sections representing the arrangement of the same merchandise on the sales floor--merchandise such as canned fruits, canned vegetables, juices, cereals, soups, canned milk, soap, and baby foods.

Commodity group segregation of merchandise resulted in increased productivity in two ways; namely, (1) the time required to check in the merchandise received against the invoice and write the item price on the case was decreased by 30 percent, as described in the following chapter, since it was easier to locate the merchandise in commodity stacks; and (2) the time required to locate and obtain a case from its storage location for subsequent handlings was decreased by 64 percent, as described in the analysis of the price-marking functions. Commodity group segregation eliminated much of the walking, and most of the "digging" through stacks, for the desired case.

In the receiving operation, commodity group segregation (using conveyors) required 21 percent more time than nonsegregation of merchandise. 10/ That is, 21 percent more time was required by the stacker to

10/ It should be understood that in all instances the merchandise was partially segregated. Part of the grocery order was loaded on the trailer by commodity group and, usually, the man in the trailer attempted to unload the trailer by commodities.

remove the case from the conveyor and stack it in its commodity group than to remove and stack the case in the order in which it was received from the truck.

Removed from conveyor and stacked
as received off the truck: 0.0690 man-minute per case

Removed from conveyor and stacked
in commodity groups: 0.0837 man-minute per case

This additional time, 0.0147 man-minute per case (29 man-minutes or 0.5 man-hours per 1,000 cases for both members of the 2-man receiving crew) was more than compensated for by the savings of 3.4 man-hours per 1,000 cases in subsequent operations. 11/

Commodity grouping was facilitated when signs were placed on the wall to identify the sections and when lines were painted on the floor to keep the stacks in line. This was especially important when the grocery order was placed in the receiving lobby or in the storeroom after store hours, for it assisted delivery personnel in placing cases in the proper section. The man in the trailer, who placed the cases on the conveyor, made the job of the stacker much easier when he selected the cases to go on the conveyor by commodity groups. He, to a large degree, controlled the time requirements for stacking by the speed with which he worked and his selection of successive cases to go on the conveyor. If successive cases were in the same commodity group less time was required by the stacker to move from section to section along the conveyor.

The Layout of the Storeroom

The purpose of a storeroom is to serve as an area where merchandise is stored and prepared for display. Storeroom operations should be performed with a minimum of handling, walking, carrying, or searching for merchandise. Conveyor installations eliminate most of the walking and carrying. Excess handling and searching can be eliminated by commodity group segregation and by proper arrangement of the stacks within the storeroom.

Two factors should be considered in the layout of the storeroom—size and shape. The number of square feet allocated to the storeroom should be determined by the grocery sales volume, number of grocery deliveries per week, merchandise turnover, and the amount of reserve stock desired.

11/ When the 4-man crew was used for unloading, 10 percent more time was required for segregation into commodity sections—0.2623 man-minute per case for unsegregated and 0.2896 man-minute per case for segregated merchandise.

Whenever possible the storeroom should be a long, narrow rectangular area (figs. 1 and 11). This type of storeroom, with the conveyor properly installed, lends itself to the most productive storeroom operation. It minimizes the distance that cases must be moved by hand from conveyor to merchandise stacks and back to the conveyor in subsequent operations. The long, narrow, rectangular storeroom permits more precise commodity group segregation and results in less searching and digging. It facilitates movement of merchandise from commodity stacks to subsequent operations, that is, price marking and stocking of merchandise.

On the other hand, the square-type storeroom (fig. 11) is the most difficult in which to operate. It is usually desirable that conveyor installations be made through the center of the square storeroom. Almost without exception, however, the average distance cases must be carried from the conveyor to the merchandise stacks (the maximum distance should not exceed 10 feet) is considerably greater than in the rectangular storeroom with an equal case capacity. Since the lineal feet of conveyor in the storeroom is directly proportional to the number of merchandise stacks perpendicular to or parallel to the conveyor, commodity segregation cannot usually be as extensive in the square storeroom as in the rectangular storeroom.

The "L"-type storeroom (fig. 11), properly equipped and operated, is somewhat less productive than the narrow, rectangular storeroom, but considerably more productive than the square-type storeroom. A conveyor properly installed in the "L"-shaped room frequently permits a minimum average case-carry distance from the conveyor but usually gives a less precise commodity group segregation than the narrow, rectangular storeroom because of the necessity for a conveyor curve in the layout. Furthermore, it is frequently necessary that the conveyor be dismantled and rearranged after the order is received to permit its maximum utilization in subsequent operations.

Studies were made of three basic stacking arrangements in the rectangular storeroom: (1) A single row of merchandise parallel to the conveyor, (2) double rows at right angles to the conveyor, and (3) a combination of the two. An analysis was made to determine which method of stacking gave maximum utilization in space of storerooms of various widths. The analysis was based on the average case, which measured 16 inches long, 12 inches wide, and 9 inches high. For purposes of comparison, the length of the storeroom was held constant at 55 feet. Case capacities for varying storeroom widths were determined for the following stack arrangements: 12/

12/ This assumes a maximum storage if all cases are placed in a permanent location.

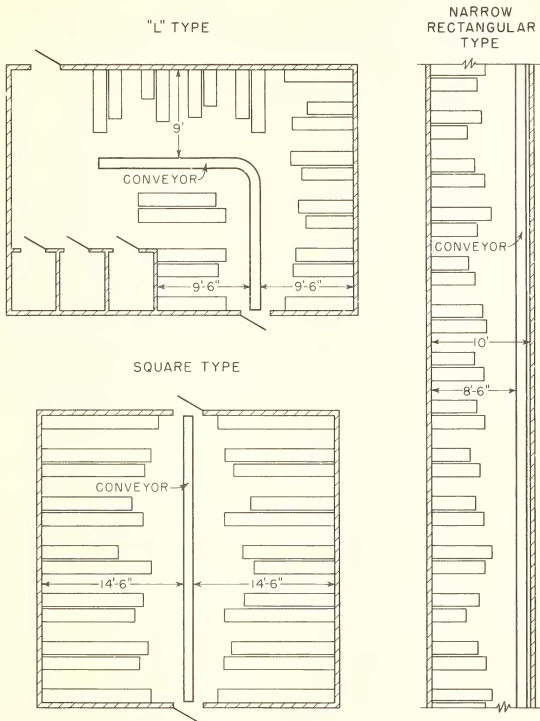


Figure 11.--Comparison of the distance between conveyor and merchandise stacks in 3 types of grocery storerooms.

A. A series of double rows perpendicular to the conveyor (the conveyor installed along one wall) (fig. 12-A).

B. A single row paralleled to the conveyor on one side and a series of double rows perpendicular to the conveyor on the other side (fig. 12-B).

C. Double rows perpendicular to and on either side of the conveyor (fig. 12-C).

D. Single rows parallel to and on either side of the conveyor (fig. 12-D).

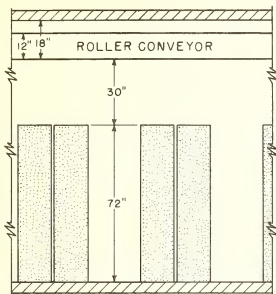
In each width of storeroom from 8 to 16 feet, arrangement "A" accommodated the greatest number of cases (table 7). This was because of the necessity for only one aisle between the conveyor and the stacks. However, as the storeroom became wider the cases had to be carried farther. It was found that 12 feet should be the maximum width for the type "A" stacking arrangement. When the storeroom was 16 feet wide or wider it was best to use the two series of perpendicular double rows (type "C"). Fewer cases could be stacked with that arrangement but the average distance to carry the case was reduced. The only time single rows along the wall (type "D") were desirable was when the storeroom was 8 feet wide or less. Even then the frequent crossing of the conveyor was inconvenient. In some instances, where a narrow storeroom had considerable wall space along coolers, rest room, or lobby, single rows were effectively stacked along these walls.

Table 7.—Capacity in cases of merchandise for different stacking arrangements and varying widths of a storeroom 55 feet long

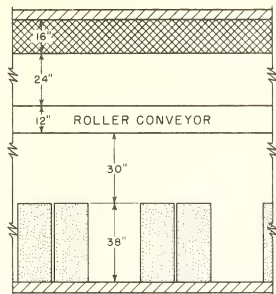
Type of stack; arrangement :	Cases that can be stored in rooms of following widths--				
	8 feet	10 feet	12 feet	14 feet	16 feet
	Number	Number	Number	Number	Number
A :	902	1,259	1,672	2,076	2,484
B :	0	1,078	1,486	1,931	2,303
C :	0	817	1,225	1,633	2,042
D :	936	936	936	936	936

All figures in table 7 were based on fully loaded stacks 74 inches high. Such a stack on the average held eight cases. When the stacks were higher than 74 inches it was difficult to place the case on the stack and to remove it. Furthermore, the higher the stack the more cases had to be moved aside when searching for a given case. Tiered shelves were found to be advantageous in the storeroom for such lightweight items as crackers

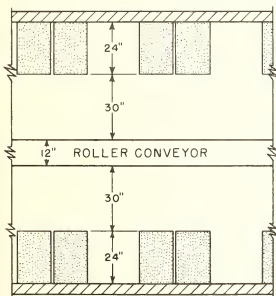
A



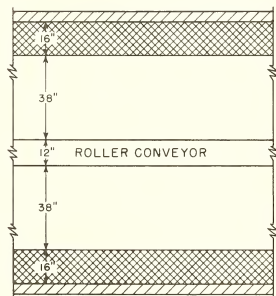
B



C



D



KEY



SINGLE ROW OF MERCHANDISE



DOUBLE ROW OF MERCHANDISE

Figure 12.--Alternative merchandise stacking layouts in a 10-foot-wide grocery storeroom.

and cookies, and for small packages such as jello and puddings. Such items were difficult to stack to a 74-inch height. Furthermore, double- or triple-tiered shelves permitted a more precise segregation for these items. This type of shelf was not found to be practical for the storage of all grocery merchandise, primarily because it reduced storeroom capacities considerably.

CHECKING IN THE ORDER AND PLACING THE ITEM PRICE ON THE CASE

The checking-in operation consisted of checking the merchandise received against the merchandise charged for on the invoice. Two methods of checking in were encountered: (1) A case count was made and the total number of cases received were checked against the total number of cases charged against the store on the invoice, and (2) a commodity count was made where each specific case on the invoice had to be accounted for. It was found that the case-count method was unsatisfactory for two reasons: (1) If the case count did not match the invoice count a commodity count still had to be taken, and (2) the case count did not show up errors that occurred within the order—where the size of unit charged for was incorrect or where there was a shortage of one commodity and an offsetting excess of another. Because of these disadvantages studies were made only on various methods of checking in by commodity counting.

Unit pricing of the case consisted of writing the unit price of the item on the identification side of the container with a red crayon or heavy pencil. 13/ Placing the unit price on the case was found to be advantageous because it eliminated the need for looking up the price on the invoice as the order was being price marked. The time required for one man to check in and unit price commodity-grouped merchandise amounted to 0.1068 man-minute per case. Of this time, 0.0286 man-minute was spent in writing the unit price on the case, while the time required to look up the unit price at the price-marking operation amounted to a weighted time of 0.0762 man-minute per case. This difference amounted to a savings of 0.8 man-hour per 1,000 cases.

Where cases were unit priced this operation occurred as the case was checked in. These two functions were performed either as the order was being unloaded or after the order had been stacked in the storeroom. The time required per case for the former method amounted to 0.2296 man-minute (table 8). 14/ Where the order had been unloaded and stacked in the storeroom, unsegregated, 0.1539 man-minute was required for the two-man operation (0.1387 man-minute for the 1-man operation) to check in and unit price each case; where the merchandise had been segregated as it was received, 0.1185 man-minute per case was required for the 2-man operation (0.1068 man-minute for the 1-man operation). Commodity-group segregation thus represented a savings of 35 minutes per 1,000 cases in this operation.

13/ In these studies invoices accompanying the order to the store indicated the selling price of the item.

14/ It was necessary to assign one man to check in the case and another to write the unit price on the case in order to maintain the desired unloading production.

Table 8.—Comparative time requirements for checking in and unit-pricing cases using various methods (2-man crew)

Method of checking in and unit pricing the case	:	Time per case	:	Time required per 1,000 cases
	:	<u>Man-minutes</u>		<u>Man-hours</u>
As the order was being unloaded	:	0.2296		3.8
After the order had been stacked	:			
unsegregated in the storeroom	:	.1539		2.6
After the order had been stacked	:			
segregated in the storeroom	:	.1185		2.0

The most effective method found for checking in and unit-pricing the order consisted of the checker (or checkers) working down the row (or rows) of merchandise locating on the invoice each item received rather than working through the invoice and walking back and forth searching for the merchandise.

Either one or two employees were used in the checking-in and unit-pricing operation. When one person performed the job he located the item to be checked on the invoice, made a notation on the invoice that the item had been received, ascertained the correct price, and wrote the price on the identification end of the case. When a 2-man crew was employed (fig. 13), one man called out the item in the stack to be checked and wrote the unit price on the case; the second man located the item on the invoice, checked it off, and called out the item price. The difference in man-minutes required per case was 11 percent:

1-man	0.1068 man-minute per case
2-man	.1185 man-minute per case

Where it was possible for the order clerk and the price marker to work as a team the 2-man crew was preferred because it familiarized both of them with (1) merchandise that had been deleted from the order, (2) item prices, and (3) location of various cases in the stack.

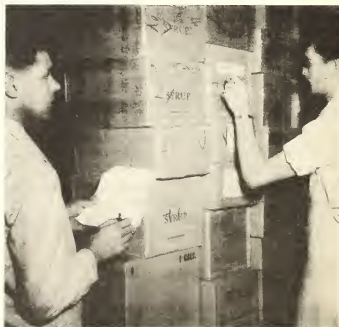


Figure 13.—Two-man crew checking in the grocery order and placing the unit price on the case.

Another method of checking in and determining the correct price of the merchandise involved checking in the case and looking up the unit price as the case was being price-marked. This procedure, which involved obtaining the invoice and pencil, locating the unit price on the invoice, checking in the item, ascertaining the price, and putting the invoice and pencil aside, was the least productive of the various methods studied, and it required an average of 0.3050 man-minute per case.

PRICE MARKING THE GROCERY ORDER

The price-marking operation required, on the average, 22 percent of grocery department man-hours, based upon data obtained from 22 stores. The operation consists of plainly identifying each merchandise unit with the correct retail selling price. The primary purpose of price marking is to indicate to the customer and to the cashier the price to be charged for the item. It is generally agreed that, with few exceptions, all items in the grocery department should be individually price-marked. Results of the price-marking analysis reported herein are based on conditions where all merchandise is priced.

Three different techniques used to price-mark grocery merchandise were encountered in the study: (1) Writing the price on the item with a pencil or crayon, (2) affixing a tag or label to the item, and (3) stamping the price on the item. Preliminary time studies and analyses of methods indicated that the first two were time consuming and expensive. Therefore they were not further analyzed in this study. The advantages of the new self-inking stamp set were analyzed as a separate study and are discussed in a later section of the report.

Case Studies of the Price-Marking Operation

Five different price-marking systems were analyzed during the course of the study. In the first four systems the stamping operation was performed in the storeroom. Each of these four price-marking systems attempted to solve one common problem—that of gaining access to lower layers in multi-layer cases (which represented 69 percent of all merchandise). In the fifth price-marking system, the merchandise was priced at the shelf just prior to the stocking operation. Methods analyses, and time studies of the methods employed to perform the detailed elements of the operation, were of greater importance than the system used. Proper performance of these elements in all of the five systems studied, resulted in an average increased price-marking productivity of 82 percent.

1. Price Marking with the Flip-board Table

Former methods.—The merchandise was carried by hand or moved on a 2-wheel hand truck from unsegregated stacks in the storeroom to the table used for price marking. The case was positioned on the flip-board table and the top cut off with a case cutter or a razor blade. In opening, the case was turned four times or 360° as the sides were cut. The price of the commodity was ascertained by inspecting the price list, which was kept on a shelf below the table top or hung on the side of the table (fig. 14). ^{15/} The band-type adjustable stamp was obtained and

^{15/} Before improvements were installed, cases were not item-priced. Looking up the price of the item occurred 43.7 times for each 100 cases.

usually adjusted for the item price and the stamp pad was picked up. The top layer of merchandise was price-marked by using the adjustable stamp and inking the stamp once for each unit priced. The stamp and pad were placed on the table, and the case, if only a single layer, was placed on the floor. If there were two layers in the case, the case was flipped over on the leaf side of the table (fig. 15) and the carton removed and placed on the left-hand side of the table. 16/ The stamp and pad were again obtained, the bottom layer price-marked, and the stamp and pad placed on the table. The carton was picked up and placed over the units and the case flipped right side up. The case was then placed on the floor. By using this procedure with the methods as described, the average skilled operator price-marked 43 cases per man-hour.



Figure 14.--Case positioned on flip-board table and price of merchandise checked (former method).



Figure 15.--Using the flip-board table (former method).

16/ It has been asserted that the top of each unit (with the unit label upright) should be priced. It is said that this procedure saves considerable time at the check-out counter. This was not found to be so, however, as the customer frequently does not place units upright at the check stand, and the cashier must handle each unit in every instance. Furthermore, many manufacturers do not pack merchandise right-side up in the container, so to assure pricing the top of each unit would require that each unit be removed from the case and inspected before the unit was stamped. Therefore, it was found advisable that each unit be priced on either the top or bottom of the container.

Improved methods.—Motion and time analyses indicated an opportunity for improved methods, work place arrangement, and equipment. The improvements were installed and operators trained in their use. As a result of the improvements the average skilled operator price-marked 82 cases per man-hour.

In order to accomplish this man-hour production, the following improvements were made in the operation: The conveyor that was used to receive the grocery order was employed to move the merchandise from segregated stacks in the storeroom to the flip-board table. (See Appendix, fig. 37.) The stamper selected cases to be price-marked and placed them on the conveyor. When the conveyor was full or all the desired cases were obtained, he returned to the flip-board table. The case was slid from the conveyor to table top (fig. 16). The unit price of the commodity had been placed on each case as it was checked in, hence it was not

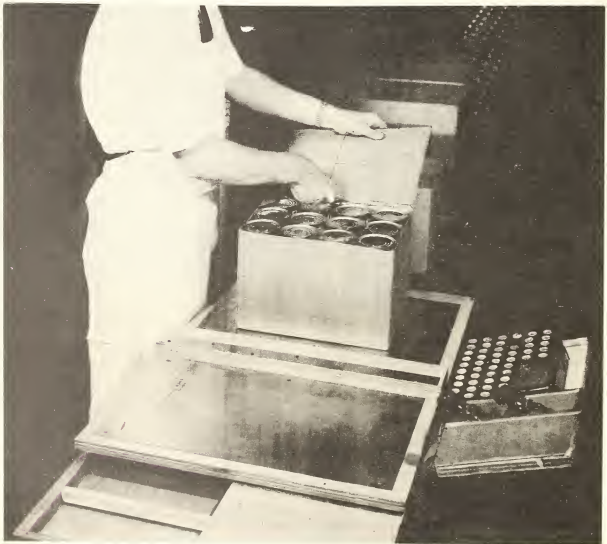


Figure 16.--Opening case by improved method after it was positioned on the flip-board table. The wheel-type conveyor was used to move the merchandise from the stacks.



Figure 17.--An improved case opener.

necessary to check the item price. An improved cutter, which had a more durable blade, was used to open the case (fig. 17). In removing the top the case remained stationary. With one continuous motion the operator cut 3 sides of the case. The top was raised, the fourth side cut (fig. 16), and the top was put in a salvage box. An improved stamp pad that held more ink, resulted in less smear, and was easier to hold, was used.

A stamp set consisting of 50 individually priced stamps was used in the price-marking operation (fig. 18). The set originally consisted of stamps of prices 5 to

42 inclusive, and the multiple prices of 3/10, 3/25, 2/13, 2/15, 2/17, 2/19, 2/21, 2/23, 2/25, 2/27, and 2/29. The stamps in this set represented 69 percent of the prices in the grocery department. ^{17/} An analysis was made of the weighted frequency of occurrence of prices in the organizations studied. It was found that prices 6, 8, 24, 34, 36, 40, 42, 3/10, and 2/13 represented prices used only for 1.2 percent of the total units stamped. They were replaced by prices 43, 47, 49, 2/31, 2/33, 2/35, 2/39, and 3/23, which represented 13.3 percent of all grocery items.

Using the improved stamp set containing the most frequently used prices resulted in an 11 percent improvement in the time required to stamp the items and also reduced the frequency of adjusting the band-type stamp from 83 percent to 16 percent of the cases. In the improved stamping operation, the stamp was touched to the stamp pad once for every three or four units priced. The number of impressions per inking of the stamp depended on the surface on which the price was placed. On canned goods or paper surfaces a clear impression was obtained on four units with each inking of the stamp. This tended to establish a rhythm, and avoided excessive changes in direction. The recommended patterns and impressions

^{17/} It is felt that an annual or semi-annual analysis of current price usage is advisable to obtain maximum benefit of any individually priced set of stamps.

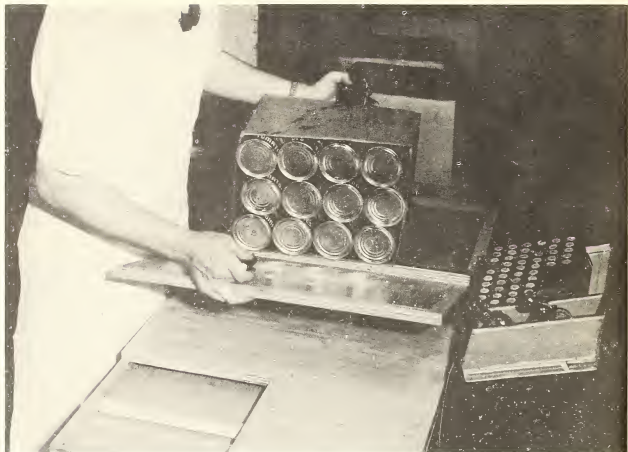


Figure 18.--Flipping the case on the flip-board table. A 50-piece individually priced stamp set was used (improved method).

per inking of the stamp (on canned goods) are as follows:

- (1) 4-unit layer (2) 8-unit layer (3) 9-unit layer (4) 12-unit layer



- (5) 15-unit layer



(Broken lines indicate a re-inking of the stamp. Examples (1), (2), and (4) represent one inking for each fair impression; examples (3) and (5) represent one inking for every three impressions. The asterisk marks the position of the price marker.)

In order to facilitate the flipping of 2-layer cases the table was covered with a plastic or a metal surface. This removed the danger of splinters, made the flip easier, and aided in the removal and the replacing of the carton. Continuous wear on a wood table resulted in an uneven surface, causing units on the top layer to fall and hindering replacement of the container. Where there were three layers in the case, the top third of the case was cut off (as previously described) without removing the top of the carton, and treated as a single-layer case, and the other two layers were treated as a double-layer case. Four-layer cases were cut in half and handled as two double-layer cases. Time requirement for handling 3- and 4-layer cases are included in all price-marking standards. The stamp and pad were not laid aside after the top layer was stamped but were held in the hands during the first flip (fig. 18). This eliminated the disposal of the stamp and stamp pad before the case was flipped, and the need for obtaining the stamp and stamp pad after the case was flipped. After the bottom layer was priced, the stamp and pad were laid aside, the carton replaced on the merchandise, and the case was flipped to an upright position. The two flips were facilitated by proper positioning of the case on the stamp table when it was obtained and by placing the carton bottom up on the table so it was ready to be replaced. The case was placed on a conveniently located 4-wheel truck.

A variation in the flip-board system of price marking was a 2-man stamping crew. One person placed the case on the conveyor, opened the case, and hauled full loads of priced merchandise to the shelf location. The other person performed the other price-marking operations. This 2-man operation was frequently used when merchandise was urgently needed to fill the shelves.

By using improved methods, layout, and equipment, the average well-trained operator price-marked 82 cases per man-hour, as compared with 43 by former methods, an increase of 91 percent. A description of the elements of operation and time required per case for each element before and after improvements are shown in table 9.

2. Removing Units from Top Layer and Stamping the Bottom Layer

In this price-marking system the merchandise was price-marked on a table, which was approximately 2 by 4 feet. Many of the elements in both the "before" and "after" studies were identical with those in the flip-board study. Only those that differ will be discussed.

Former method.—The case was either carried from unsegregated stacks to the table or moved on a 2-wheel hand truck. The case was opened, the price checked, stamp adjusted, top layer priced, and stamp and pad laid aside. All units in the top layer were removed from the carton and placed on the table near the case (fig. 19). The stamp and

Table 9--Comparative time per case required for price-marking the grocery order with the use of a flip-board by the former and improved methods

Description of element	Former method			Improved method		
	Element	1/	2/	Element	1/	3/
	Number	Minutes		Number	Minutes	
Obtain case from stock	37	0.2600		50	0.0930	
Position case on stamping table	38	0.0684		51	0.0466	
Open case; dispose of top	39	0.1538		52	0.1119	
Check price of item	40	0.0762		--	4/	
Obtain band-type stamp, adjust, obtain stamp pad	41	0.1648		41	0.0257	
Obtain stamp and stamp pad	42	0.0065		53	0.0308	
Stamp top layer	43	0.1523		54	0.0942	
Flip case and remove carton	44	0.0707		55	0.0896	
Stamp bottom layer, dispose of stamp and stamp pad	45	0.1113		56	0.0736	
Replace carton and flip case	46	0.0857		57	0.0684	
Dispose of case	47	0.0608		58	0.0467	
Sum of irregular elements	48 & 49	0.0111		5/	0.0173	
Total man-minutes per case		1.2216			0.6378	
Personal and fatigue allowance (15 percent)		0.1832			0.0957	
Standard requirement in man-minutes per case		1.4048			0.7335	
Standard per man-hour		43 cases			82 cases	

1/ For full description of elements see Appendix.

2/ For details of production standard see Appendix, table 25.

3/ For details of production standard see Appendix, table 26.

4/ Unit price previously placed on container.

5/ Elements 48, 49, 59, and 60.

pad were obtained, the bottom layer stamped, the stamp and pad were laid aside, units were replaced in the carton, and the case was placed on the floor. Production on this operation was 39 cases per man-hour.

Improved methods.--Improvements in work-place arrangement, methods, and equipment were similar to those in the flip-board improved study. The one difference was in the method of stamping the bottom layer. After stamping the top layer, and retaining the stamp and pad in hand, 2 rows of the top layer were removed (2 or 3 units at a time, depending on the size of the units and the number of units per row) and placed on the table beside the case. Units in the 2 exposed bottom rows were stamped, 2 top rows of units were moved aside and the newly exposed units were stamped (fig. 20). This procedure was repeated when a 6-row double-layer case was stamped. The stamp and pad were placed on the table and units that had been removed were replaced in the case. Production on the improved operation was 72 cases per man-hour as compared with 39 cases with former methods--an increase of 85 percent. Elements and time per case of the former and improved studies are given in table 10.

3. Moving the Flip-board Table to the Merchandise Stacks in the Storeroom

In the two previously described price-marking systems the merchandise was moved to the stamping table and, after being price-marked, hauled to



Figure 19.--Removing the units from the top layer of a 2-layer case to stamp the bottom layer (former method).



Figure 20.--Removing from 3 to 6 units from case and moving aside remaining units in top layer in order to stamp units in bottom layer (improved method).

Table 10.---Comparative time per case required for price marking when top layer cans are removed to stamp bottom layer by the former and improved methods

Description of element	Former method		Improved method	
	Element	Time per case	Element	Time per case
	1/	2/	1/	5/
	Number	Minutes	Number	Minutes
Obtain case from stock	37	0.2600	50	0.0930
Position case on stamping table	38	.0684	51	.0466
Open case; dispose of top	39	.1538	52	.1119
Check on price of item	40	.0762	--	<u>4/</u>
Obtain band-type stamp, adjust, obtain stamp pad	41	.1649	41	.0257
Obtain stamp and stamp pad	42	.0065	53	.0308
Stamp top layer	43	.1523	54	.0942
Remove top layer of case	61	.1268	--	--
Stamp bottom layer, dispose of stamp and stamp pad	45	.1164	--	--
Replace units of top layer	62	.1441	--	--
Remove 2 rows of units from top layer, stamp exposed units, move other units in bottom layer aside, stamp exposed units, dispose of stamp and stamp pad, and replace units to case	--	--	63	.2545
Dispose of case	47	.0608	58	.0467
Sum of irregular elements	48 & 49	.0111	<u>5/</u>	.0173
Total man-minutes per case				.7207
Personal and fatigue allowance (15 percent)				.1081
Standard requirement in man-minutes per case				<u>.8288</u>
Standard per man-hour		39 cases		72 cases

1/ For full description of elements see Appendix.

2/ For details of production standard see Appendix, table 27.

3/ For details of production standard see Appendix, table 28.

4/ As the operator positioned the case on the table he read the item price which had been previously marked on the case during the check-in operation.

5/ Elements 48, 49, 59, and 60.

the shelf location. Only that merchandise which was required to fill the shelves was price-marked at that time. In the third system studied the flip-board table was moved on casters from stack to stack. All unpriced merchandise in the stacks was stamped regardless of whether it was needed on the shelf.

Certain store operators felt that all merchandise in the storeroom stacks should be price-marked as soon as possible after receipt. The advantage of this procedure was that merchandise needed at the shelf during week-end rush periods (when store labor usually was required elsewhere) could be stocked without a delay for price marking. The primary disadvantage of the system was related to price changes. If a considerable amount of storeroom merchandise had to have price changes the advantages gained were more than offset by this additional operation. It was, therefore, obvious that having all storeroom merchandise price-marked was practical only in those stores where relatively few cases were carried over from one week to the next.

Former method.--The case was selected from a stack (unsegregated) and placed on the flip-board table. After being price-marked the case was returned to its original location in the stacks or if needed at the shelf was placed directly on a stocking truck. All other elements were the same as those previously described for the former method on the flip-board table. Production by the former operation was 54 cases per man-hour.

Improved method.--The flip-board table was moved alongside a stack, the case placed on the table, price-marked, and disposed of either to a stocking truck or to a row parallel to the row of cases being price-marked. This reduced the distance the case had to be moved to the flip-board table and again when it was removed from the price-marking table. Methods used to perform the other elements in the improved operation were the same as for the improved flip-board table operation. The man-hour production was 93 cases (table 11). 18/

4. The Half-case Method

Another approach to the problem of price marking the bottom layer was to cut the case in half. Each half was then treated as a single-layer case. This system applied only to 2-layer cases; for single-layer

18/ It should be noted that those cases which were moved to the merchandise stacks after being price-marked were subject to an additional handling when they were obtained for the stocking of shelves. The percentage of cases thus handled was dependent on the size of the normal storeroom inventory and varied considerably from store to store. This factor was not considered in developing the production standard. In one store an additional time of 0.0413 man-minute per case was required for the extra handling.

Table 11.--Comparative time per case required for price marking when flip-board table was moved to the merchandise stacks by the former and improved methods

Description of element	Former method		Improved method	
	Element 1/	Time per case 2/ Minutes	Element 1/	Time per case 3/ Minutes
Obtain case from stack and position on flip-board table	64	0.0510	69	0.0510
Open case; dispose of top	39	.1538	52	.1119
Check price of item	40	.0762	--	--
Obtain band-type stamp, adjust, obtain stamp pad	41	.1649	41	.0257
Obtain stamp and stamp pad	42	.0065	53	.0308
Stamp top layer	43	.1523	54	.0942
Flip case and remove carton	44	.0707	55	.0396
Stamp bottom layer, dispose of stamp, and stamp pad	45	.1113	56	.0736
Replace carton and flip case	46	.0867	57	.0584
Dispose of case	65	.0608	58 & 70	.0394
Sum of irregular elements	4/	.0371	4/	.0371
Total man-minute per case		.9703		.5617
Personal and fatigue allowance (15 percent)		.1455		.0843
Standard requirement in man-minutes per case		1.1158		.6460
Standard per man-hour		54 cases		93 cases

1/ For full description of elements see Appendix.

2/ For details of production standard see Appendix, table 29.

3/ For details of production standard see Appendix, table 30.

4/ Elements 48, 49, 59, 60, 66, 67, and 68.

cases the top of the carton was removed. In both the former and the improved methods, many of the elements are similar to those previously discussed.

Former method.—The case was obtained from unsegregated stacks and placed on a stamping table. The case was turned three times as it was cut in half. The item price was checked, both layers were stamped, and the two halves disposed of to the floor. Production for this system was 46 cases per man-hour.

Improved method.—As with other methods previously described, the conveyors were so installed that they could be used in the stamping operation. Since it was no longer necessary to position the case on the table one handling was eliminated. The operator obtained the case from the segregated merchandise stacks in the storeroom, placed it on the conveyor, and cut the case in half. Three sides were cut in one motion and the case was then turned over with the uncut side uppermost. Thus the operator could effectively cut the fourth side since he could easily spot the starting and stopping points of the initial cut (fig. 21). Previously the operators experienced difficulties in completely cutting the case in half, and frequently they had to recut a side or the corners.

The cases rolled by gravity to the discharge end of the conveyor where a price-marking set was attached to the conveyor. The operator selected the proper stamp and priced both halves of the case. The stamp and pad were disposed of, then one-half case was placed on top of the other half and the two halves were moved to the truck located at the end of the conveyor. Three- and four-layer cases were divided into 2 sections. The single-layer section of the 3-layer case was treated like the half case of a 2-layer case. For the resulting 2-layer sections of the 3-layer and 4-layer cases, two rows of units of the top layer were removed to facilitate the price marking of the lower layer. Units of the top layer were then moved aside and the remaining units in the lower layer were stamped. When this operation occurred the time to perform the



Figure 21.--Cutting the case in half (improved method).

element was included in element No. 73, "Stamp merchandise, dispose of stamp and stamp pad," (see p. 76). The average well-trained operator priced 96 cases per man-hour with the improved methods, layout, and equipment (table 12). 19/

5. Price Marking at the Shelf

In the previous four systems, the price marking was performed in the storeroom and usually one person specialized in that operation. To combine operations and eliminate an extra handling of the cases, some operators price-marked the merchandise at the shelf location prior to placing the units on the shelf. In this instance each stock clerk price-marked the merchandise for his section.

Former method.--The merchandise was moved to the shelf on 2-wheel trucks and the cases were spotted on the floor near their proper shelf location. The case was opened by turning the case 90° four times and cutting each side separately. The band-type adjustable stamp was obtained and adjusted, and the top layer stamped, the same former methods being used as previously discussed (fig. 22). The priced units were placed on the shelf. If the case had more than a single layer the stamp and pad were again picked up, the bottom layer priced, and the stamp and pad disposed of. Average man-hour production for the pricing operation was 65 cases. 20/

Improved methods.--The average operator, by using improved methods, increased productivity to 104 cases per man-hour. The improvements were the same in principle as those installed for previously discussed

19/ Several factors should be considered in connection with the "half-case" system when comparing its productivity with the other price-marking systems. After the case was cut in half there were 2 units to handle rather than one. This increased the time per case to stock merchandise by 0.0615 man-minute--2 units had to be positioned at the shelf and 2 cartons had to be torn and disposed of rather than 1 for 69 percent of the cases. If the cartons were used at the check-out operation, cutting the case in half rendered the smaller cartons useless for carry-outs. On the other hand, where girls were used to stock shelves, the half case was easier for them to handle.

20/ Obtaining unpriced cases from storeroom stacks and moving the cases to the price-marking operation were considered to be part of price marking, as described heretofore for the storeroom price-marking systems. Where cases were price-marked at the shelf, that time required to load unpriced cases from storeroom stacks onto the stocking truck was charged to the price-marking operation. In the former operation cases were obtained from unsegregated stacks of merchandise. In the improved operation cases were obtained from stacks of segregated merchandise. Moving the cases from the storeroom to the shelf location on the sales floor was considered to be a part of the stocking operation.

Table 12.--Comparative time per case required for price marking with the half-case method by using the former and improved methods

Description of element	Former method			Improved method		
	Element	Time per case	Element	Time per case	Element	Time per case
	1/	2/	1/	2/	1/	2/
	Number	Minutes	Number	Minutes	Number	Minutes
Obtain case from stock	37	0.2600	50	0.0930		
Position case on table	71	.0684	--	4/		
Open case; dispose of top	39	.0477	52	.0347		
Cut case in half and separate the halves	72	.1360	75	.1022		
Check price of item	40	.0762	--	5/		
Obtain band-type stamp, adjust, obtain stamp pad	41	.1649	41	.0290		
Obtain stamp and stamp pad	42	.0065	53	.0271		
Stamp merchandise, dispose of stamp and stamp pad	73	.2564	76	.1580		
Dispose of single-layer cases	47	.0188	58	.0145		
Dispose of two (one-half) cases to floor	74	.0882	77	.0679		
Sum of irregular elements	48 & 49	.0111	5/	.0173		
Total man-minutes per case		1.1342				.5437
Personal and fatigue allowance (15 percent)		.1701				.0816
Standard requirement in man-minutes per case		1.3043				.6253
Standard per man-hour		46 cases				96 cases

1/ For full description of elements see Appendix.

2/ For details of production standard see Appendix, table 31.

3/ For details of production standard see Appendix, table 32.

4/ Merchandise was price marked on conveyor.

5/ Unit price was previously placed on container.

6/ Elements 48, 49, 59, and 60.

price-marking systems. The 50-unit price-marking set was attached to the handle end of each 4-wheel stocking truck. ^{21/} All cases that were to be stocked on the bottom shelf were moved from the truck to the floor in front of the item location and opened and price-marked in this location. Cases that were to be stocked on the middle and top shelves were opened and price-marked on the 4-wheel truck (table 13).

It was found that where improved methods were used with two adjustable band-type stamps (1 for single unit prices and 1 for multiple-unit prices) in place of the 50 unit price-marking set, the average operator price-marked 95 cases per man-hour.

In the 5 case studies previously described, improvements in methods, equipment, and work place

arrangement resulted in increased production of from 60 percent to 109 percent (table 14). Production for the best system (price marking at the shelf), while using improved methods, was 104 cases per man-hour. On the other hand, production for one of the poorer systems (removing units from the case), in use before the study was made, amounted to 39 cases per man-hour. Thus, the best system produced 167 percent more than one of the poorer systems. The comparative higher production for the system in which merchandise was stamped at the shelf resulted from the elimination of the elements necessary to get at the bottom of 2-layer cases. However, when the price marking was performed at the shelf



Figure 22.--Price marking at the shelf location (former method).

^{21/} Two types of 4-wheel trucks were used: When price marking was performed at the shelf during store hours, the 12- by 36-inch platform truck was used; and when price marking was performed by night stocking crews, the 24- by 48-inch platform was used.

Table 13.--Comparative time per case required for price marking at the shelf by the former and improved methods

Description of element	Former method		Improved method	
	Element	Time per case	Element	Time per case
	1/ Number	2/ Minutes	1/ Number	5/ Minutes
Obtain case from stock	78	0.1438	145	0.0930
Open case; dispose of top	39	.2006	52	<u>4/</u> .1314
Obtain band-type stamp, adjust, obtain stamp pad	41	.1649	41	.0257
Obtain stamp and stamp pad	42	.0164	53	.0450
Stamp top layer, dispose of stamp and stamp pad	43	.1523	151	.0942
Pick up stamp and stamp pad, stamp bottom layer	45	<u>5/</u> .1093	79	.0684
Dispose of stamp and stamp pad	--	--	80	.0304
Sum of irregular elements	<u>6/</u>	<u>.0127</u>	<u>6/</u>	<u>.0127</u>
Total man-minute per case		.8000		.5008
Personal and fatigue allowance (15 percent)		<u>.1200</u>		<u>.0751</u>
Standard requirement in man-minute per case		.9200		.5759
Standard per man-hour		<u>65 cases</u>		<u>104 cases</u>

1/ For full description of elements see Appendix.

2/ For details of production standard see Appendix, table 33.

3/ For details of production standard see Appendix, table 34.

4/ Cases stamped on the 4-wheel truck at the shelf were seldom at the most convenient working height. Therefore, more time was required to open the case than in systems previously described. Also carton lids were moved to a rail on the stock truck whereas in storeroom stamping they were flipped into a nearby box; thus, the carton lid disposal required slightly more time for shelf price marking.

5/ This includes disposal of stamp and stamp pad.

6/ Elements 48, 49, and 66.

during store hours, the merchandise was located on the truck at the shelf position for the additional time necessary to stamp the merchandise. This objectionable feature of the stamping at the shelf system was not present when the stamping and stocking operations were performed during hours when the store was not open.

Table 14.—Comparative production in cases per man-hour of 5 price-marking systems, by use of former and improved methods, equipment, and layout

Method (Type)	:Production in cases:			Percentage increase in production
	: per man-hour :			
	: Former :	Improved :		
	: <u>Number</u>	<u>Number</u>		<u>Percent</u>
	:			
Price marking with the stationary:	:			
flip-board table	: 43	82		91
Removing units from top layer	: 39	72		85
Moving the flip-board table to	:			
merchandise stacks	: 54	93		72
The half-case method	: 46	96		109
Price marking at the shelf	: 65	104		60

Irrespective of which price-marking system was used, substantially increased production resulted in each system from the use of proper methods, proper work place arrangement, and proper equipment in performing the various elements of the price-marking operation—the procedure being obtaining the case, opening the case, stamping the merchandise, and disposing of the case.

Combining the Receiving and Price-marking Operations

For several stores the truck trailer, containing the grocery order, was left at the rear door of the store to be unloaded at the store employee's convenience. In a single operation the order was unloaded, checked in, the item price placed on the case, units in the case price-marked, and more than half of the merchandise placed on 4-wheel stocking trucks ready for hauling to the sales floor. Several crew arrangements, ranging from 3 to 8 persons, were analyzed, the 3-man crew being the most effective. Conveyors were used to move the merchandise through successive steps in the operation. When the flip-board table was used in the price-marking operation, the conveyor was positioned across the table top (fig. 23). When a 3-man crew was employed, 1 person worked in the trailer, opening the case and placing it on the conveyor. The second person checked in the order and placed the item price on the case, priced the top layer of most cases, and, after the remainder of the case was price-marked by a third person, disposed of most of the cases to hand trucks or to a storeroom storage location. A shelf was incorporated in one section of



Figure 23.--Price marking on the flip-board table in a combination receiving, checking-in, and pricing operation.

the conveyor, which held the 50-piece individually priced stamping set, a band-type stamp, stamp pad, invoice, and pencil. The third person priced part of the top layers and all of the bottom layers and helped dispose of the cases. The 2-layer cases were flipped directly off the conveyor onto the flip-board table and after the merchandise was priced, flipped back onto the conveyor.

In a variation of this system, the flip-board table was discarded and multi-layer cases were cut in half. In this operation the third person price-marked all the merchandise while the second person checked in, placed the item price on the case, and, after the units had been price-marked, disposed of the cases to stocking trucks or to a permanent storeroom location. (See footnote 18, page 41.)

Where the receiving, checking-in, and price-marking operations were performed separately, and when use was made of improved methods and improved equipment and work-place arrangement, as previously described, total time requirements for these three operations, when the flip-board table was used for price marking, was 1.0661 man-minutes per case (table 15). Combining these operations and using the flip-board table required 11 percent more time, or a total of 1.1844 man-minutes per case for the three functions. With the half-case, the combined operation time requirements for the receiving, checking-in, and price-marking operations amounted to only 0.8832 man-minute per case, 8 percent less than when these three functions were performed separately. Although combining operations eliminated handlings, lack of crew balance when the flip-board table was used increased man-hour requirements, the operator unloading and opening the cases in the trailer having an unavoidable delay of 0.0949 minute per case. ^{22/} When cases were cut in half the man in the trailer had no delay. ^{23/} In the former system when two persons were stamping, each person had to obtain stamp and pad, adjust the band-type adjustable stamp, and dispose of the stamp. When there was only one stamper, the stamp and pad were obtained and disposed of only once for each case.

When the receiving, checking-in, and price-marking operations are combined, it is important that the work be so allocated that there is a minimum amount of employee delay for other members of the crew. It is also necessary that sufficient truck trailers be available at reasonable cost and that local conditions permit the dropping of trailers at the store. This combined method of receiving, checking in, and price marking can also be effectively used when the grocery order is stacked in the receiving lobby by the truck crew after store hours. The person who normally worked in the trailer now places the cases on the conveyor in the lobby.

Price Marking with the Self-inking Stamp Set

An analysis was made of a relatively new type of price-marking set that contained self-inking stamps. Each stamp in the set had a porous rubber tip that retained ink and permitted 500 to 800 impressions per inking of the stamp. Two types of stamps were in the set: 1 for single prices, and 1 for multiple unit prices (fig. 24). The handle of the stamp was sufficiently long to facilitate the pricing of units in the lower layer of 2-layer cases. The individual prices represented in the set, as well as the number of stamps, varied to meet the price-marking requirements of the organization. The manufacturer's standard

^{22/} For details of production standard see Appendix, table 35.

^{23/} For details of production standard see Appendix, table 36.

Table 15.--Comparative time requirements per case for the receiving, checking-in, and unit-pricing, price-marking operations (using improved methods, equipment, and layout) when performed as separate operations, and when performed as one operation

Operation	Price-marking with the flip-board table		Price-marking using the half-case method	
	Performed as a separate operation	Performed as a combined operation	Performed as a separate operation	Performed as a combined operation
	Number man-minutes	Number man-minutes	Number man-minutes	Number man-minutes
Receiving	1/ 0.2141	--	1/ 0.2141	--
Checking-in and unit-pricing	2/ .1185	--	2/ .1185	--
Price-marking	3/ .7335	--	4/ .6253	--
Total	1.0661	5/ 1.1844	.9579	6/ .8832
Cases per man-hour	56	51	63	68

- 1/ See Appendix, table 22.
2/ See table 8, p. 30.
3/ See Appendix, table 26.
4/ See Appendix, table 32.
5/ See Appendix, table 35.
6/ See Appendix, table 36.

set contains 80 stamps—46 single and 34 multiple-unit-price stamps. ^{24/} The bottom part of the stamp was tapered to insure a snug fit when the stamp was placed in the holder. This minimized the evaporation of ink from the porous tip when the stamp was not in use.

In addition to the conventional long-handled set, tests were made on a similar set that had stamps with 3-inch handles (fig. 25). These shorter handles caused the stamps to remain more upright in the set, hence less time was required in searching for or disposing of the stamp. The 3-inch handle was also more convenient to hold in the hand while stamping. This type of stamp was approximately 5 percent more productive than the long-handled stamp.

The conventional long-handled (7 inch) self-inking price-marking set was studied under the following conditions: (1) When the stationary flip-board table was used in the storeroom, (2) when the cases were cut in half in the storeroom, and (3) when the merchandise was stamped at the shelf. ^{25/} In each instance, improved methods, layout, and equipment, as developed in the price-marking study, were used. When the self-inking set was substituted for the 50-unit price-marking set, the increase in production averaged 13 percent in the 3 systems (fig. 26).

^{24/} The price-marking sets used in this study contained 100 stamps (60 single and 40 multiple prices) that represented the most frequently used prices in the organization where the tests were conducted (fig. 24). This number of stamps was superior to any lesser number because (1) the stamps represented prices for 99.995 percent of all units price-marked, and (2) with proper training there was no hesitation in searching for or disposing of the stamp in the operation.

^{25/} For details of production standards see Appendix, tables 37, 38, and 39.

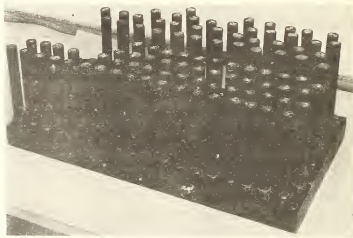


Figure 24.--The long handled, 7-inch self-inking stamp set, containing the single-price and the multiple-price stamps.



Figure 25.--The 3-inch-handle self-inking stamp set.

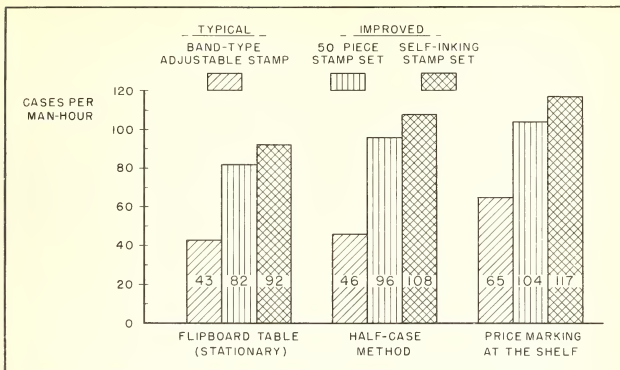


Figure 26.--Results of the application of improved methods, layout, and equipment in the price-marking operation.

The self-inking stamp, in itself, does not guarantee increased productivity. As has been indicated previously, the price-marking equipment is only as productive as the methods that are used with it.

Care of equipment is also important in attaining maximum utilization of any type of grocery department equipment. Many examples have been encountered where failure on the part of employees to follow manufacturers' recommendations on care and use of equipment has resulted in little or no advantage in use of the equipment.

It has been found advantageous to assign a complete set of stamping equipment to each regular price-marking employee; otherwise, equipment responsibility is lacking, and parts of the equipment are borrowed and frequently misplaced or lost.

STOCKING GROCERY ITEMS IN THE RETAIL FOOD STORE

Shelf stocking accounted for approximately 42 percent of the man-hours in the grocery-handling operation of the retail self-service food stores covered in this study. This function consisted of moving the merchandise from the storeroom to the shelf; preparing the shelves to receive the merchandise; placing the items on the shelf; the handling of part cases (when the shelf would not accommodate a full case); disposing of empty cartons or merchandise containers; and other miscellaneous elements that occurred. Since stocking accounted for such a large percentage of the total labor requirements in the grocery-department operation, improvements resulted in substantial savings. All stocking studies discussed herein were made with conventional-type wall shelving and gondolas.

Obtaining the Merchandise from the Storeroom

In the former operation of many stores the cases were stacked on the floor at the price-marking table in the storeroom after they had been price-marked. They remained there until they were picked up and loaded on 2-wheel hand trucks and moved to the shelf location. The use made of 2-wheel and 4-wheel trucks was analyzed. The former carried an average load of 5.6 cases; the 12-by 35-inch (4-wheel) platform truck (fig. 27) had an average capacity of 16 cases. A rack was incorporated on the 4-wheel platform truck to hold salvaged cartons. On the basis of an average distance of 100 feet from storeroom to shelf location, the time per case to haul merchandise on the 2-wheel hand truck was 0.2299 man-minute. ^{26/} For the same distance, the time per case when the 4-wheel truck was used was 0.0966 man-minute. ^{27/} On the basis of 1,000 cases, the 4-wheel truck represented a savings of 2 hours and 13 minutes. These figures, when adjusted for distance from shelf location to storeroom, should apply to any store since the primary factor involved in the savings was the increased load capacity of the 4-wheel hand truck.



Figure 27.--Moving cases to the shelf location with a 4-wheel stocking truck.

^{26/} For details of production standard see Appendix, table 40.

^{27/} For details of production standard see Appendix, table 41.

The movement of cases from the storeroom to the shelf location was more difficult when the grocery merchandise was stored in a basement. In one store (see fig. 3) a "1-way" power belt conveyor was employed to elevate the merchandise from the basement to the sales floor. In the former operation a stock clerk, when ready to load his stocking truck, called to an employee in the basement to place cases on the conveyor. The price-marked cases were obtained from the floor near the flip-board table and carried to the conveyor (fig. 28). The stocking clerk operated the conveyor and removed the cases from the discharge end of the conveyor and placed them on the floor or on a hand truck. The stocking clerk had frequent delays while waiting for merchandise to move up the conveyor from the basement. He loaded the merchandise on the 2-wheel hand truck and moved it to the shelf location, unloaded the cases at the shelf, and returned them to the conveyor. The time per case to move the merchandise from the price-marking table to the shelf location was 0.5736 man-minute.

In the improved operation the conveyor was equipped with an additional switch that could be operated by the price marker in the basement. The flip-board table was located at the conveyor, and the case was moved directly from the point of the price-marking operation onto the conveyor (fig. 29). At the discharge end of the power conveyor two 10-foot sections of 18-inch-wide wheel-type gravity conveyors were installed to accommodate an accumulation of from 15 to 20 price-marked cases off the power conveyor. The stocking clerk obtained the cases off the gravity conveyor and placed them on a 4-wheel stocking truck (fig. 30). The merchandise was then transported to the shelf location. The time per case to move the merchandise from the storeroom to the shelf location, using improved methods and equipment, was 0.2099 man-minute. This reduction from the time required in the former operation represented a saving of 6.1 man-hours per 1,000 cases.



Figure 28.--Placing case on belt conveyor in basement by former method. Price-marked cases were obtained from the floor, near the flip-board table, and carried to the conveyor.

It was found that only 4-wheel trucks should be used in grocery-stocking operations, and that a sufficient number should be available to

have a ratio of one truck for every stocking employee. 28/ The use of the 4-wheel truck resulted in decreased customer inconvenience because full cases and empty cartons were not scattered on the floor in traffic aisles, since most cases were stocked directly to the shelf from the truck and the empty cartons were either broken down and placed on the truck rack or, where they were used at the check-out stands, were placed nested on the truck. The disposal of salvage and the return to the storeroom for more merchandise were combined into one trip. This was seldom possible when the 2-wheel hand truck was used. The 4-wheel truck was easily pushed from one location to another, thereby eliminating the necessity of carrying the cases by hand. As was indicated in the discussion on price-marking, the 4-wheel truck should be loaded at the stamping

table as the disposal part of the price-marking operation. This eliminates the necessity for a restacking of cases on the truck. It is also well to repeat that cases price-marked by commodity group make possible a minimum amount of back-tracking on the sales floor between different commodity sections.

Placing the Items on the Shelf

The methods used to place the merchandise on the shelf were almost as numerous as the number of operations studied. Variations in method were dependent on two factors: The position of the case during the stocking operation, and the number of units handled simultaneously from the case to the shelf. The case was positioned at the shelf in one of three locations: (1) On the floor, (2) on the hand truck, or (3) on the shelf edge, and held in position on the operator's knee or against his abdomen. The handling of units from the case to the shelf fell into three classifications (1) Each item was removed from the case with one hand, passed to the other hand, and placed on the shelf (fig. 31); (2) one hand moved each item individually to the shelf, the other hand



Figure 29.--Placing the case on the belt conveyor by the improved method. The carrying of cases was minimized with the use of the wheel-type conveyor and convenient location of the flip-board table.

28/ Larger 24- by 48-inch 4-wheel platform type trucks were used in some stores. They tended to block the aisles when used for daytime stocking; for night stocking, however, they were satisfactory.

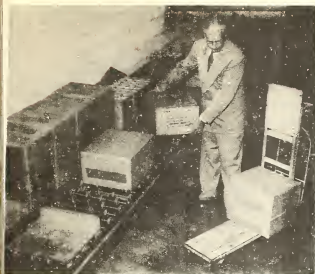


Figure 30.--The store manager demonstrates the improved method of removing the case from the belt conveyor.

held the case at the shelf location; and (3) each hand moved one or two units simultaneously from the case to the shelf.

In most stores where stocking studies were conducted, the usual procedure consisted of spotting all cases on the floor at the proper item location. Merchandise was then usually stocked from the floor to the shelf by passing each item from hand to hand. Time studies showed that the proper location for the case was dependent on which shelf the items were to be placed. Stocking the case from the floor required the shortest amount of time when the merchandise was placed on the bottom

shelf, but required the greatest amount of time for stocking the middle and top shelves. Stocking two units simultaneously from the 4-wheel hand truck to the middle and top shelves averaged 38 percent more productive than stocking with the same method from the floor, but averaged 19 percent less productive than when the case was held at the shelf. It became apparent that the proximity of the case to the point of shelving was a major factor in stocking productivity. The difficulty in obtaining maximum productivity by stocking from the hand truck lay in the inability of the operator to position the case between himself and the shelf. All units had to be moved through a 90° arc from the case on the truck to the shelf.

Although resting the case on the shelf edge and holding it in position was the most productive



Figure 31.--Stocking from the floor to the shelf, one unit at a time (former method).

method of stocking the middle and top shelves, this technique was fatiguing and frequently impractical, particularly when the case rested on the shelf against fragile merchandise.

As is evident from table 16, more time was required to pass units from hand to hand, or to stock units singly with one hand, than to use both hands to stock simultaneously. This was true whether the case was positioned on the floor, on the truck, or held in position at the shelf. When the case was stocked from the floor to the bottom shelf, there was an advantage of 59 percent in stocking units simultaneously with both hands over the former method of passing each unit from hand to hand. For units stocked from the floor to the middle and top shelves, this advantage amounted to 15 percent and 13 percent for the two positions, respectively. When the case was stocked from the 4-wheel hand truck, the advantage of stocking with both hands simultaneously amounted to 27 percent, 15 percent, and 17 percent for the bottom, middle, and top shelves, respectively.

It was difficult to train employees to stock consistently with both hands simultaneously from the truck to the middle or top shelf. The tendency was to pass units from hand to hand, which was fatiguing and time consuming.

It became apparent that maximum stocking productivity could be obtained if the case could be positioned between the stock clerk and the shelf. For bottom shelf stocking the case could be placed on the floor; but for middle and top shelf stocking it was impractical to place the loaded stock truck between the employee and the shelf for two reasons: (1) It placed the employee farther than an average reach from the shelf, and (2) cases on the truck more often than not were too high or too low to the appropriate shelf.

In order to make possible convenient positioning of cases at the proper level for maximizing the use of both hands, a leaf-type shelf to support the case was developed.

Using the Case Support in Stocking Merchandise

The first step in the development of the case support was the construction and analysis of use of a removable type of shelf to support the case. This was carried on the hand truck, and the operator attached it to the middle shelf prior to stocking the case. After stocking the case of merchandise he either moved the case support to a new location on the shelf or returned it to the stocking truck. Time studies showed no over-all gain in production. The failure to improve productivity was due to the necessity of moving the case support back and forth between the truck and the shelf. A leaf type of sliding shelf was then built into the shelving to support the cases. These 12- by 18-inch case supports were made from 3/4-inch plywood. The case supports were suspended by "Z" type irons from beneath the middle shelf (fig. 32).

Table 16.--Comparative time per case required to shelve 24 No. 2 or 24 No. 303 cans by various methods of shelving

Shelf level	Case on floor 1/		Case on 4-wheel hand truck:		Case held at shelf 2/	
	Passed hand:	Two units : : to hand :	Passed hand:	Two units : : simultaneously, to hand :	Single unit:	Two units : : simultaneously, with one hand:
	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes
Bottom	: 0.6000	: 0.3768	: 0.5256	: 0.4128	: --	: --
Middle	: .7896	: .6888	: .5784	: .5040	: 0.5184	: 0.3960
Top	: .8736	: .7728	: .6480	: .5520	: .6720	: .4584
1/	Includes the time required to position the case on the floor.					
2/	Includes the time required to position the case at the shelf.					

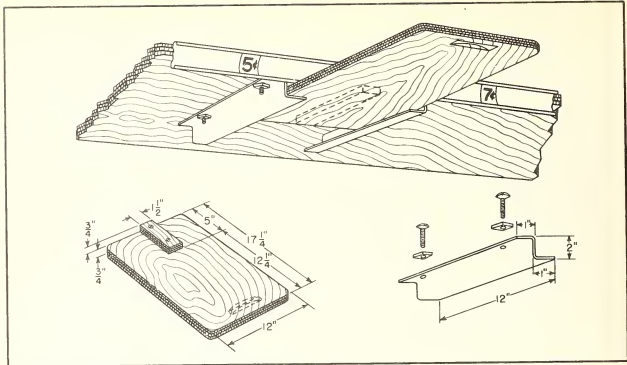


Figure 32.--The leaf-type case support developed for efficient shelf stocking.

One case support was installed in each 3-foot section of shelving on all wall and gondola shelves except those used for bulky commodities, such as bag-ware or flour, cereal, soap powder, soft drinks, and paper products (fig. 33). When the case supports were not being used they were concealed by sliding them under the shelf (fig. 34). During night stocking operations, when an entire section was to be stocked, the operator usually pulled out all of the case supports in that section. For day stocking operations, the case support was pulled out individually as needed. With the case on the support between the commodity location and the operator, two or four items were easily stocked simultaneously to either the middle shelf or the top shelf (fig. 35). The shelf case support was put to an additional use by serving as a prominent display case when management wished to feature week-end specials (fig. 36).

The case support made possible maximum productivity in the shelving portion of the stocking operation. By positioning the case between the employee and the shelf, minimum time requirements for stocking the bottom,



Figure 33.--Case supports pulled out ready to be used for stocking. The supports were installed in conventional grocery store shelving.

middle, and top shelves were obtained—0.3768, 0.3960, and 0.4584 man-minutes, respectively, for a case of 24 No. 2 or 24 No. 303 cans. 29/

Other Stocking Operations Were Important

Another of the time-consuming jobs in the stocking operation consisted of arranging merchandise on the shelf before additional items were shelved. Except for those commodities that were to be rotated, it was found that the rearrangement was best performed by working an entire section before the shelving of that section was begun. For those commodities that were rotated, improved productivity resulted from arranging the shelf for each commodity immediately prior to stocking that commodity.

The method of handling part cases (those cases that could not be completely shelved because of shelf space limitations) differed from store

29/ When all types of grocery commodities are considered, including glass and paper container items, the time requirements for filling all shelves from the average case of 25.9 units amounted to 0.7416 man-minute; 0.6864 man-minute for 24 units.

te store. Where there was no space available beneath the gondola or wall shelving for the storage of part cases, these cases were returned to the storeroom and placed in one section set aside for that purpose. Where sufficient space was available beneath the gondola or wall shelving, part cases were usually stored temporarily in these spaces until sufficient shelf space had been made available to receive those unstocked units. Where relatively few excess units remained in the case, several part cases were frequently consolidated in one container to conserve space beneath the shelves. In order to assure proper turnover of part-case stock, it was found advantageous to shelve this merchandise each week before bringing out additional cases from the storeroom.

Handling of salvage cartons involved breaking each carton down flat. This function usually was performed after a truckload or section had been stocked. This double handling of each carton was eliminated by breaking the carton down immediately after the case was stocked and moving the carton directly to the salvage rack on the 4-wheel truck. On returning to the storeroom for another load of merchandise, the



Figure 34.--Case supports concealed under the middle shelf of the conventional type of shelving.



Figure 35.--Use of case support to stock shelves. With the case support between the commodity and the operator 2 or 4 items can easily be stocked simultaneously to the middle or top shelf.



Figure 36.--The case support serves the additional use of providing a prominent display space to feature week-end specials.

salvage cartons were either placed in a large salvage rack or separated by type, and tied and stacked in the salvage area before the truck was reloaded. In those stores where some of the cartons were used in place of bags at the check-out operation, it was found advisable to nest those cartons on the truck as the cases were emptied and to transport them on the truck to the salvage storage area in the storeroom.

The Use of Improved Methods and Equipment Increased Stocking Man-hour Production by 61 Percent

Time studies showed that the use of former methods and equipment resulted in an average production of 23 cases per man-hour for the entire stocking operation. ^{30/} Through the use of improved methods and the

^{30/} For details of production standard see Appendix, table 42.

4-wheel stocking truck, this productivity was increased to 31 cases. ^{31/} This improvement, which did not include using the case support, increased productivity by 35 percent.

Additional studies were made of the entire stocking operation, with and without the use of the case support. Improved methods and equipment were used in both studies. The case support increased stocking production by 19 percent--from 31 to 37 cases per man-hour. ^{32/} Perhaps as important as increased production was the reduction of fatigue resulting from less bending and turning of the body, or from holding the case at the shelf.

Thus, it was possible in a typical grocery department to increase average stocking production by 61 percent--from 23 cases per man-hour to 37 cases per man-hour--through the installation of proper equipment and the training of personnel in improved handling methods.

^{31/} For details of production standard see Appendix, table 43.

^{32/} For details of production standard see Appendix, table 44.

RESULTS OF APPLYING IMPROVED METHODS AND EQUIPMENT IN THREE TEST STORES

Studies were made in three test stores, having different layouts and operating policies, of over-all productivity in the receiving, checking-in, price-marking, and stocking operations where improved methods and equipment were substituted for their former methods and equipment. Personnel were trained in the improved methods and equipment for each of these operations. The over-all increase in productivity for the three stores was 71 percent in store A, 87 percent in store B, and 67 percent in store C (table 17).

In the former receiving operation all stores used the 2-wheel hand truck for unloading. Stores A and C employed a 2-man crew, and store B a 5-man crew. In the improved operation, stores A and C employed 2-man crews and store B a 2-1/3-man crew. All stores used gravity conveyors.

In the former method of checking in the grocery order, stores A and C used a 2-man crew to check the order in unsegregated commodity-group stacks after the entire order was unloaded. Store B checked in the order as it was being unloaded. In the improved operation all stores checked in the order, using a 2-man crew, from segregated commodity-group stacks, after the entire order was received.

In store A, where the bulk of price marking was done when the store was closed, the merchandise was price-marked at the shelf location, both in the former and in the improved operation. In the former operation the merchandise was moved to the shelf on 2-wheel hand trucks, cases were unloaded in front of shelves, prices marked, and merchandise shelved by passing it from hand to hand. This operation was improved by moving the merchandise to the shelf location on a 4-wheel hand truck, spotting the bottom shelf items on the floor, price marking the merchandise by use of a 50-unit price-marking set, and then shelving the middle- and top-shelf items directly from the truck.

In stores B and C, where price marking was done in the back room, the former method was to select the merchandise from unsegregated stacks and carry it by hand or move it by 2-wheel hand truck to the stamping table. Band-type stamps were used. In store B the cases were cut in half, price-marked, and placed on the floor, whereas in store C the top layer was stamped, turned over by use of a flip-board, bottom layer stamped, turned again, and set upon the floor. Both back room price-marking operations were improved by using a conveyor to obtain the merchandise from segregated stacks and move it to the stamping table. A 50-unit price-marking set was used for stamping. After stamping by either the half-case method or flip-board method the merchandise was transferred to a 4-wheel hand truck. Even with these improvements price marking in the back room was slightly less efficient than when done at the shelf.

Table 17.--A comparison of the time per case, using former methods, with the time per case, using improved methods, for receiving, checking in, price marking, and stocking grocery items in 3 test stores.

Operation	Store A					Store B					Store C				
	Former		Improved			Former		Improved			Former		Improved		
	Man-	Table	Man-	Table		Man-	Table	Man-	Table		Man-	Table	Man-	Table	
	minutes	No.	minutes	No.	minutes	minutes	No.	minutes	No.	minutes	minutes	No.	minutes	No.	No.
	Number		Number			Number		Number			Number		Number		
Receiving	0.5700	1/	0.1789	21		0.6394	18	0.2141	22		0.2668	19	0.1789	21	
Checking in order	.1539	8	.1185	8		.2296	8	.1185	8		.1539	8	.1185	8	
Price marking	.9200	33	.5759	34		1.3043	31	.6253	32		1.4048	25	.7335	26	
Stocking	2.6532	42	1.6328	44		2.6532	42	1.6328	44		2.8028	2/	1.7313	2/	
Total time	4.2971		2.5061			4.8265		2.5907			4.6283		2.7622		
Cases per man-hour	14.0		23.9			12.4		23.2			13.0		21.7		
Percentage increase															
in production	--		71			--		87			--		67		

1/ Data for receiving operation for store A were not previously included in this report.

2/ Basement operation for store C necessitated double handling from basement to sales floor.

The time per case to stock the grocery items, both by the former and the improved methods, was the same in stores A and B, but differed in store C because additional time was required to obtain cases for stocking owing to the basement operation. The former method employed in stores A and B obtained the merchandise for stocking from unsegregated stacks in the back room by use of a 2-wheel hand truck. In store C the merchandise was carried from the basement to the store by means of a belt conveyor. It was reloaded on a 2-wheel hand truck on the store floor. In all three stores the merchandise was then unloaded from the 2-wheel hand truck in front of the shelf locations. The shelves were prepared for stocking and the units shelved by passing units from hand to hand and, occasionally, by using only one hand—one unit at a time.

The decreased stocking time in the three stores reflects principally improvements in obtaining merchandise from segregated stacks in the back room by the use of a 4-wheel hand truck, and the use of the case support for shelving the merchandise. Improvements in the use of the belt conveyor in store C also helped considerably in reducing stocking time in this store.



APPENDIX

Description of Elements

The Receiving Operation

1. Obtain case and position at trailer door.--The man in the trailer selected cases from the merchandise stacks, carried them to either the rear or side door of the trailer, and placed them on the floor in the doorway.
2. Delay of work until hand truckers return to trailer.--Occasionally there was not a hand trucker on hand to move the merchandise into the storeroom. Both the man in the trailer and the person who placed the cases on the ground were idle until the hand trucker returned from delivering his previous load.
3. Delay for stacker.--In some instances the stacker at the trailer door could not handle the cases as fast as the man in the trailer placed them in the doorway. This usually occurred when the latter was working near the trailer door and therefore had little distance to carry the case.
4. Rearrange cases in trailer.--The man in the trailer attempted to select successive cases that would make a good load on the 2-wheel hand truck. If he was obtaining canned goods, and a lightweight item was in the way, he would set it aside since it should not be placed on the hand truck with heavy cases.
5. Move pallet(s) aside.--Most case merchandise, especially canned goods, was loaded in the trailer on pallets. When the merchandise was cleared from a pallet, the pallet was moved aside to prevent a congested areaway.
6. Pick up cases from trailer floor and position on ground.--The cases that were placed in the doorway by the stacker were placed on the ground in stacks (5 to 6 cases per stack) ready to be loaded on 2-wheel hand trucks. In store No. 3 the man in the trailer stood on the ground when removing the first few cases from the trailer.
7. Help load 2-wheel hand truck.--The man who obtained cases from the trailer floor and placed them on the ground would tilt the stack of cases so the hand truck could move under the stack. After this occurred he would push the stack onto the hand truck.
8. Delay for man in trailer.--As the distance in the trailer from doorway to stacks increased, it took the operator longer to obtain the case. This extra time for some cases to be obtained delayed the work of the man on the ground.

9. Rearrange load on 2-wheel hand truck.—Just as the man in the trailer occasionally had to lay aside a case that would not fit on the 2-wheel hand truck, so did the man on the ground have to adjust the cases on the hand truck so they would ride better.

10. Fix slide in trailer so cases would slide.—The nose section in some trailers was higher than the rest of the trailer floor. In this instance, the operators occasionally constructed a makeshift slide so the cases would slide from the nose section to the side door of trailer.

11. Delay while stacker completes a load of cases.—The hand trucker stood by while the stacker completed stacking a hand truckload at the door of the trailer.

12. Load 2-wheel hand truck and move to storeroom.—The hand trucker, with the stacker's assistance, loaded the hand truck and moved the loaded truck to the storeroom.

13. Unload 2-wheel hand truck in storeroom.—The hand trucker tilted the hand truck forward and, while the stacker in the storeroom tilted the stack of cases, pulled the hand truck away from the stack.

14. Return empty 2-wheel hand truck to trailer.—After the hand trucker removed the hand truck from the stack of cases he returned to the trailer for another load.

15. Delay at trailer while other 2-wheel hand truck was loaded.—Frequently, when the hand trucker arrived at the trailer the other 2-wheel hand truck was not loaded. He was idle until the other truck was loaded.

16. Help unload 2-wheel hand truck in storeroom.—The stacker in the storeroom tilted the stack of cases to facilitate the removal of the hand truck.

17. Place cases in stacks along wall.—The stacker took the case off the stack and placed it along the wall. The cases were placed so that heavy ones were on the bottom of the stack and lightweight ones on top of the storeroom stacks.

18. Delay for hand truckers.—The time required to place the cases in stacks was less than the time required for the hand truckers to obtain and haul in the merchandise; hence the stacker in the storeroom frequently had delays between loads.

19. Obtain case and stack a 2-wheel hand truckload on trailer floor.—The man in the trailer placed the cases in a stack ready for the 2-wheel hand trucker. He selected successive cases so as to build a stack that would not be damaged in transit to storeroom.

20. Delay for man with 2-wheel hand truck.--More time was required to haul the merchandise to the storeroom than to pick up a load of cases and stack them on the trailer floor; hence, the man in the trailer had frequent delays while awaiting the return of the hand trucker.

21. Load 2-wheel hand truck.--The hand truck was tilted back to position the cases firmly on the hand truck.

22. Wheel 2-wheel hand truck to storeroom and unload hand truck.--The operator unloaded the stack in rows in the storeroom without help.

23. Return to trailer with 2-wheel hand truck.--After the cases were unloaded in rows the operator returned to the trailer. He pushed the 2-wheel hand truck into the trailer and up to the stack of cases which the stacker had placed on the truck floor.

24. Delay for 2-wheel hand truck to be loaded.--Occasionally, the hand trucker returned to the trailer before the man in the trailer had completed the stack. He was idle until the stack was completed.

25. Rehandle cases at trailer door.--Since the man in the trailer had less to do than the hand trucker, he (the trailer man) often had so many cases in the trailer doorway that the hand trucker could not reach a case. In this instance, the man in the trailer would pick up the case and reposition it in the doorway.

26. Pick up case from trailer floor and place on 2-wheel hand truck.--Since the hand trucker both loaded the hand truck and moved it to the storeroom, the hand truck was always available. He took the case from the trailer floor and placed the cases in a stack on the hand truck.

27. Unload 2-wheel hand truck in storeroom.--The operator tilted the hand truck forward while he balanced the stack of cases and moved the hand truck out from under the stack.

28. Stack and rearrange cases in storeroom.--Because of limited storeroom space, it was often necessary to double stack some of the cases. As long as floor space was available the loads were dumped in rows. Thereafter the cases were placed on top of existing stacks.

29. Install conveyor.--In each study, part of the conveyor was never dismantled; hence, sections were added to the existing setup. The conveyor could be installed through either the side or rear door of the trailer. It took twice as many man-minutes to install the conveyor through the rear door since additional sections were added as needed. Only one section was used through the side door whereas two or more were used through the rear door. This element includes "climb into trailer."

30. Pick up case; place on conveyor.--The case was obtained from a stack in the trailer and carried to and placed on the conveyor. Each case

was given a slight push as it was placed on the conveyor. The distance of the carry depended on whether the side or rear door was used for unloading. Usually, the carry was less for the rear door installation because additional conveyor was added to decrease the carrying distance.

31. Remove case from conveyor and move to stack.--The case was taken from the conveyor, the momentum of the case always being utilized, and placed either in stacks parallel to the conveyor or in double rows of stacks perpendicular to the conveyor.

32. Delay for merchandise from trailer.--Infrequently, the stacker in the storeroom had to wait for cases. This occurred because the man in the trailer had additional elements to perform, such as move pallets aside or rearrange cases in trailer.

33. Pick up case and hand to other operator.--When the trailer was unloaded from the side door an additional person was added to the crew for approximately one-third of the load. This was desirable because of the increased carry time as the stacks were worked away from the center of the truck. One person would obtain the case from the stacks in either the nose or the rear of truck and hand it to the other employee who placed it on the conveyor.

34. Receive case from helper and place on conveyor.--One employee took the case from the other employee (see element description No.33) and placed it on the conveyor.

35. Delay for man in storeroom.--This occurred infrequently when the stacker in the storeroom was unable to keep up with the man in the trailer. The latter waited until the former had cleared the conveyor.

36. Delay for merchandise from trailer (2 men).--With two persons unloading the conveyor there are occasional delays while the men wait for merchandise to come down the conveyor. This normally occurs while the man in the trailer is rearranging cases or moving pallets aside.

37. Obtain case from stock (2-wheel hand truck).--The hand truck was pushed to the merchandise stacks. The operator obtained cases, moving aside unwanted cases when necessary, and placed the desired cases in a stack in the aisle. The hand truck was loaded and moved to the stamping table and unloaded. Occasionally the cases were obtained individually and carried to the stamping table.

38. Position case on stamping table (former method).--The case was picked up off the stack or floor and placed on the table.

39. Open case; dispose of top (former method).--The case was opened with a cutter or razor blade by making four cuts around the top of the case, turning the case once for each cut. The top was put on the floor.

40. Check on price of item.--When the operator did not know the correct price for the commodity he searched through the price list for the price. The price list was usually kept under the table or hung on the wall. This element was necessary for approximately one-half of the cases.

41. Obtain and adjust band-type stamp; obtain stamp pad.--The band-type adjustable stamp was used to stamp the merchandise. It was necessary to adjust the stamp whenever successive cases had different prices. This stamp was used for single- or multiple-unit prices. In the improved method separate stamps were used for single- and multiple-unit prices. After the stamp was adjusted the operator picked up the stamp pad.

42. Obtain band-type stamp and stamp pad.--When successive cases had the same price it was not necessary to adjust the stamp. The operator merely picked up the stamp and stamp pad. This occurred for 16.7 percent of the cases.

43. Stamp top layer; dispose of stamp and stamp pad.--The top layer was the upper layer of 2-layer cases, and the only layer of single-layer cases. In the typical operation the stamp was inked for each unit priced. After pricing the units the stamp and stamp pad were disposed of.

44. Flip case and remove carton (former method).--In order to price mark the lower layer of merchandise the case was tilted and flipped on to a leaf that was hinged at the center of a 24 by 48 inch table. The carton was slipped off and laid aside, open side up. This occurred for approximately 69 percent of all grocery cases. When there were three layers the top third of the case was cut off and treated as a single-layer case. The remaining two layers were treated as a 2-layer case. When there were four layers the case was cut in half and the two halves treated as 2-layer cases.

45. Obtain stamp and stamp pad; price mark bottom layer; dispose of stamp and stamp pad.--It was necessary again to obtain the stamp and stamp pad. The items were price-marked as in No. 43 above, and the stamp and stamp pad disposed of.

46. Replace carton and flip case (former method).--The carton was picked up, reversed, and positioned over the merchandise. The hinged leaf was grasped with the right hand and raised, throwing the case to an upright position on the opposite side of the table; the left hand was used to guide the case as it was being flipped.

47. Dispose of case to floor.--This element consisted of removing the case from the price-marking table and placing it in stacks on the floor near the table.

48. Change blade in cutter.—Whenever the blade broke or became dull the old blade was removed and a new one inserted.

49. Ink stamp pad.—Through use and evaporation the supply of ink in the pad gradually diminished. To re-ink the pad, a small amount of ink was poured on the pad and, with a piece of cardboard or a piece of cloth, smoothed over the pad. If the pad was inked too heavily, the impression on the unit was smeared.

50. Obtain case from stock (conveyor).—The wheel-type gravity conveyor that was used to receive the grocery order was not completely dismantled; several sections were utilized in the price-marking operation. The operator selected cases from the commodity stacks and placed them on the conveyor. The case moved by gravity to the price-marking table. In the half-case method the case moved toward the discharge end of the conveyor. Usually several cases were placed on the conveyor, after which the operator returned to the price-marking table to price them.

51. Position case on price-marking table (improved method).—The discharge end of the conveyor was at the same height, and attached to the stamping table. The operator merely slid the case from the conveyor onto the table.

52. Open case; dispose of top (improved method).—The cutter was obtained and with the case motionless three sides of the case were cut in one motion. The top was raised with one hand while the fourth cut was made. The top and cutter were disposed of simultaneously.

53. Obtain stamp and stamp pad.—A 50-piece individually priced stamp set was used to price mark the merchandise in the improved operation. This stamp set, along with the cutter, stamp pad, and band-type adjustable stamps, was placed on an inclined shelf that was attached to the front of the price-marking table. The operator reached for the stamp and round-type stamp pad simultaneously. When the half-case method was used the stamp set was attached to the conveyor.

54. Stamp top layer.—The units on the top layer (or single layer of a one-layer case) were stamped in a standard pattern and the stamp was inked only once for every 3 or 4 impressions. The stamp and stamp pad were not disposed of immediately after performance of this element.

55. Flip case and remove carton.—The stamp and stamp pad were retained, one in each hand, while the case was flipped. (When the self-inking stamp was used only the stamp was retained in the hand.) The table top was covered with a metal or plastic surface that facilitated the flip. The carton was set aside with the open top face down on the table.

56. Stamp bottom layer; dispose of stamp and stamp pad.--Units were stamped as described in element No. 54. The stamp and stamp pad were returned to the table shelf after the bottom layer was stamped.

57. Replace carton and flip case.--The carton was picked up and positioned over the merchandise and the case was flipped to its upright position.

58. Dispose of case to stocking truck.--A 4-wheel stocking truck was located convenient to the price-marking table. The case was removed from the table at the completion of the flip element and placed on the truck. By using the half-case method the single layer case was moved from conveyor to stocking trucks.

59. Position stocking truck.--The stock clerk usually positioned an empty stocking truck when he obtained the merchandise to go to the floor. Occasionally the stamper had to obtain the stocking truck and position it near the table.

60. Switch stocking trucks.--This element consisted of removing a loaded stocking truck from the price-marking area and positioning an empty stocking truck.

61. Remove top layer of case.--All units in the top layer were removed, two at a time, and placed on the price-marking table.

62. Replace units of top layer.--After the bottom layer was price-marked and the stamp and stamp pad disposed of, the units that previously were placed on the table top were returned to the case.

63. Remove 2 rows of units from top layer, stamp exposed units in bottom layer, move other units in top layer aside, stamp exposed units, dispose of stamp and stamp pad, and replace units in case.--This element consisted of removing enough units so the operator could stamp the exposed units in the bottom layer. Then other units on the top layer were slid over units of the bottom layer that had been priced. When all units of the bottom layer were priced, the two rows of units were replaced and the stamp and stamp pad moved to the table.

64. Obtain case from stacks and position on flip-board table.--In this operation the flip-board table was mounted on wheels and moved along the aisle to the merchandise that was to be priced. The table was positioned at the end of the stack and cases were obtained from the stack and placed on the table.

65. Dispose of case to stacks or to stocking truck.--All the merchandise in the storeroom was price-marked after the order was unloaded. Not all the items could be accommodated on the shelves, hence they were returned to the stack. Those items which would go on the shelves were placed on hand trucks.

66. Move salvage container.--Inasmuch as the flip-board table was moved from stack to stack, the salvage box into which the case tops were thrown, also had to be moved occasionally. It was not moved as long as it was near enough for the operator to throw the tops into it, however. When merchandise was price-marked at the shelf the salvage container was moved from section to section.

67. Move flip-board table.--The table was pushed from one commodity group of merchandise to another. Thus, the price-marking table was moved to the cases instead of moving the cases to a stationary table.

68. Move stock truck.--When the table was moved the stock truck was also moved to the new location.

69. Obtain case from stack and position on flip-board table.--In this instance the table was moved alongside the row of stacks. The case was obtained from the stack adjacent to the table and placed on the table.

70. Dispose of case to stack.--Those items that could not be accommodated on the shelves were returned to the storeroom stacks.

71. Position case on table.--A 2-by 4-foot flat-top table was used for price marking in the former half-case system. Cases were moved from stacks on the floor to the table.

72. Cut case in half and separate halves (former method).--This element occurred only for multi-layer cases. Using a cutter or a razor blade, the operator made four cuts, moving the case 90° for each cut. The case was then spread open. Frequently it was necessary to recut corners or places where the original cut was not complete. The cutter or blade was placed on the table.

73. Stamp merchandise; dispose of stamp and stamp pad (former method).--Half cases were handled the same as single-layer cases. In stamping the items the stamp was inked for each unit stamped. After pricing the items the stamp and stamp pad were placed on the table.

74. Move two (one-half) cases to floor.--Each one-half case was taken separately from the table and placed on the floor or on a stack.

75. Cut case in half (improved method).--The case was opened after being placed on the conveyor. On single-layer cases the top was removed and disposed of. For 2-layer cases the operator cut three sides in one continuous motion, keeping the case stationary. The case was then placed on its side (uncut side up) so the beginning and end of the initial cut could be seen. The fourth side was then cut and the two halves separated and laid on the conveyor. The cutter was moved to a shelf attached to the conveyor.

76. Stamp merchandise; dispose of stamp and stamp pad.--The 50-piece individually priced stamp set was positioned on a shelf attached to the conveyor. The shelf was movable. Space was provided for the cutter, stamp pad, and band-type adjustable stamps. The merchandise was price-marked as in No. 54, the stamp being inked only once for every 3 or 4 impressions and according to a definite pattern. After the case had been priced, the stamp and pad were usually moved to the shelf. Occasionally, it was possible to stamp several cases in succession when they had the same unit price.

77. Dispose of two half cases to stocking truck.--In the improved operation one-half case was picked up and placed on top of the other half and the two halves were moved simultaneously to the stocking truck, which was located at the discharge end of the conveyor.

78. Obtain case from stock (load on 2-wheel hand truck).--This element consisted of obtaining the case, including the moving aside unwanted cases, placing the desired case on the hand truck or in a stack ready to be loaded, and, if necessary, replacing cases not needed. It did not include the moving of the cases from the merchandise stacks to the shelf location in the store.

79. Obtain stamp and stamp pad; stamp bottom layer.--The individual stamp and the stamp pad were obtained from a shelf or truck and the bottom layer of the case was priced.

80. Dispose of stamp and stamp pad.--After stamping, the stamp and stamp pad were disposed to the shelf on the stocking truck.

Combined Receiving - Checking the Order - Price Marking

81. Delay for other members of the crew.--The elements performed by the man in the trailer required less time than the elements performed by the other two members of the crew. As a result, he was frequently idle.

82. Restack cases in trailer.--Occasionally, when the man in the trailer obtained a case from the stacks and carried it to the conveyor, the conveyor was full. He would then set the case beside the conveyor on the floor. When this happened (12.8 percent of the time) there was a double handling of the case.

83. Push cases down conveyor.--It was not advisable to have enough pitch for the cases to roll by gravity. One operator had to stop the case to check it in and place the unit price on the case. The stamper had to stop the case to flip it onto the flip-board table. If the cases rolled freely the conveyor would frequently be loaded when the latter crew member attempted to flip the case back on the conveyor; therefore, each of the three operators occasionally had to push the cases down the conveyor.

84. Check in and write unit price on the case.--The operator ascertained the commodity on the conveyor and then searched for that item on the invoice, which, incidentally, also listed the unit price of each item. He placed a check mark in the appropriate column, checked the item price, and wrote that price on the side of the case.

85. Obtain invoice from shelf.--The operator would check in and place the unit price on several cases, lay the invoice on the shelf, and perform other functions--price marking and disposing of the cases. When he returned to his former station he obtained the invoice from the shelf, which also held a stamp set and stamp pad.

86. Change location.--The operator's functions--checking in the order and placing the price on the case, price marking, and disposing of the case--were performed at different locations. This element represented the movement between work stations.

87. Stamp top layer and dispose of stamp and stamp pad.--The units were stamped in a pattern and by inking the stamp only once for every 3 or 4 impressions. The stamp and stamp pad were disposed of after performance of this element.

88. Move case to stack or stocking truck.--Those items that could immediately be placed on the shelves were moved from the conveyor to a stocking truck located at the discharge end of the conveyor. The other cases were placed in the appropriate commodity stack.

89. Position case on conveyor for flipping.--The case was not always properly positioned to be flipped onto the table. When this was so, the operator moved the case on the conveyor into position.

90. Flip case and remove carton from conveyor.--The conveyor was installed over one side of the flip-board table. The operator flipped the case off the conveyor and onto the hinged leaf of the table.

91. Replace carton and flip case onto conveyor.--After the case was price-marked the carton was replaced and the case was flipped directly onto the conveyor and given a slight push so as to make room for the next case.

92. Move conveyor to new location.--In order to facilitate the disposal of cases to the stacks, additional conveyor sections were added and moved once during the operation. This decreased the carrying time from conveyor to stack.

93. Move stocking truck aside and obtain empty truck.--When a stock clerk was not available to move the loaded stocking truck to the sales floor, one of the price-marking crew moved it aside and obtained an empty truck.

Price Marking with the Self-Inking Stamp Set

94. Obtain self-inking stamp.--The proper stamp was selected from the stamp set that was positioned on the table.

95. Stamp top layer.--The items were stamped, patterns being followed as discussed on page 36.

96. Stamp bottom layer and dispose of stamp.--The items were stamped as in element No. 95 and the stamp returned to the stamp set.

97. Stamp merchandise and dispose of stamp.--For a 2-layer case all units were stamped in one operation, the stamp then being returned to the stamp set.

98. Obtain stamp.--The self-inking stamp was obtained from the set located on a shelf on the stocking truck.

99. Stamp top layer and dispose of stamp.--The units were stamped following a prescribed pattern and the stamp disposed of.

100. Pick up stamp and stamp lower layer.--The stamp was obtained and the bottom layer stamped.

101. Return stamp to set.--The stamp is returned to the proper hole in the stamp set.

Obtain and Move Merchandise to the Shelf Location

102. Search for and obtain hand truck.--It was not always possible to have a hand truck convenient when several persons were using these trucks. Hence, occasionally, it was necessary to search for one and move it to the storeroom.

103. Position hand truck at stack and load.--The cases were normally placed on the floor in stacks at the end of the price-marking operation. This element consisted of obtaining the 2-wheel hand truck, moving it to the stack, and loading a stack of cases onto it.

104. Move truck to shelf location.--The 2- or 4-wheel hand truck was moved from the grocery storeroom into the store proper and to the commodity shelf location.

105. Unload hand truck at shelf location.--The load of cases was dropped off the hand truck near the shelf.

106. Move stocking truck aside.--It infrequently happened that another hand truck had to be moved aside in order to gain access to stacks of merchandise.

107. Return to storeroom with truck.—(Procedure self-explanatory.)

Stocking Shelves

108. Move cases aside to obtain merchandise.—When the desired case was not the top one of a stack, other cases had to be set aside and replaced.

109. Spot cases at shelf.—For 58 percent of the cases the operator would take one case off the hand truck and place it at the shelf location, and then move on to the next shelf location to place the next case from the truck. This continued until the hand truck was unloaded.

110. Move case on baskart to shelf location.—Occasionally the operator would place the case on a shopping cart, known as the baskart, wheel it to the shelf location, and stock the merchandise from the shopping cart.

111. Pre-position case at shelf.—The load of cases was dropped at the commodity location. This element consisted of moving a case from its initial position on the floor to the item location on the shelf. This occurred for about half of the cases.

112. Inspect shelf to see what items are needed.—Before obtaining merchandise from the storeroom and positioning the case at the shelf, the operator inspected the merchandise on the shelf to ascertain what items were needed.

113. Rearrange old merchandise on shelf.—Generally, the merchandise on the shelf had been picked over and was disorganized. Before new merchandise was shelved it was necessary to rearrange the items that were on the shelf.

114. Clean shelf.—This was accomplished with a duster or a piece of cloth. Usually the shelf was cleaned before and after the old merchandise was rearranged on the shelf.

115. Place cardboard separators between layers on shelf.—Some items when stacked on two or more levels were rather unsteady—especially those in glass containers. The cardboard separators that separated units in the original cartons were placed between layers on the shelf. Occasionally it was necessary to cut or tear the cardboard to fit a given space in a section.

116. Repair label on item.—Infrequently the label would come off of a canned item. The operator then obtained tape and repaired the label.

117. Reposition case at shelf.—This represents a rehandling of a case at the shelf caused by an inaccurate positioning originally.

118. Obtain and position salvage carton.--This occurred when the merchandise was stamped at the shelf and the container was used to hold case lids as they were removed.

119. Remove items to rotate stock.--On such commodities as cereal, candy, bread, and crackers, the old merchandise was removed from the shelf and the new merchandise was placed in behind the old.

120. Replace items after rotation.--After the current merchandise was stocked the old items were replaced.

121. Position case at shelf.--The operator obtained the case from the 4-wheel stocking truck and positioned it at the shelf preparatory to shelving.

122. Obtain case to stand on.--To reach one section of the wall shelving, it was necessary to stand on something. A full case was used for this purpose.

123. Sit on case to stock bottom shelf.--Rather than bend over or kneel to stock the bottom shelf the operator sometimes sat on a case of merchandise.

124. Face merchandise on shelf after stocking.--In stocking the shelves it was not always possible to fill a commodity section completely. Either merchandise was not available or perhaps a section lacked a few units of being full and the stock clerk did not desire to open a full case. In either instance, the stock clerk would pull units forward to give the section of shelving the appearance of being full.

125. Rearrange merchandise on entire section of shelving.--Occasionally an employee would rearrange the old merchandise in an entire section before stocking it, rather than rearranging the old block to accommodate each new case, as in No. 113.

126. Fix price tags.--It was not uncommon for price tags positioned on the shelf molding to slide out of place, thus requiring repositioning. Occasionally the molding price had to be changed because of price changes. When either of these situations existed the employee adjusted the molding price tags to proper position and/or correct price. Spare price tags were kept in a special kit that usually was carried on the stocking truck.

127. Obtain duster to clean shelf.--The duster normally was kept in the storeroom. The operator looked for it and when he had obtained it he returned with it to the proper shelf location.

128. Lay aside empty cartons.--After the case was stocked it was necessary to dispose of the empty container. In this instance it was laid on the floor by the shelf to be taken care of after a truckload of cases or a section had been stocked.

129. Tear and dispose of carton.--Two procedures were in common usage: Tearing each corner and folding the sides down against the bottom of the container, or pulling out the flaps on the bottom and collapsing the container. The method adopted was determined by the degree of difficulty in opening the bottom of the carton.

130. Move salvage box.--When the salvage box blocked passage in the aisle or when the operator moved to a new shelf location the salvage box was moved.

131. Consolidate empty cartons.--The cartons or empty containers that previously had been laid aside were gathered together, or, in the improved operation, "nested," for carrying either to the check-out area or to the storeroom. In the improved operation the cartons were taken to the backroom at the time the 4-wheel truck was returned.

132. Take empty cartons to storeroom.--The cartons, after being assembled and consolidated, were carried to the storeroom.

133. Dispose of salvage in storeroom.--This step includes the setting aside of cartons that were later used to carry out groceries and the placing of torn-down cartons in a large salvage container.

134. Place full case under shelf.--Some cases were excess and could not be accommodated on the shelf. These were placed under the shelf and stocked at a later date.

135. Place part case under shelf.--When several units of the case could not be accommodated on the shelf, the partly full case was placed under the shelf. Once or twice a week the stock clerk would pull out the merchandise from under the shelf and stock those items where there was space on the shelf.

136. Consolidate units of several part cases in one carton.--This occurred when only a few units of a case remained after the section was full. In order to conserve space under the shelf the units were removed and put into another partly full case of the same commodity group.

137. Rearrange part cases under shelf.--To make room for additional partial cases those already under the shelf were reorganized.

138. Shelving units.--The units were obtained from the case and placed on the shelf.

139. Position case at shelf (on floor or on shelf case supports).--The case was removed from the stocking truck and either placed on the floor to stock the bottom shelf, or on the shelf case supports to stock the middle and top shelves.

140. Take cases from stocking truck and set aside.--Occasionally the stock clerk had to take a case from the stocking truck and set it aside in order to get to the case that was to be stocked.

141. Open case supports.--The employee would open the case supports for an entire section of shelving before stocking that section. This element consisted of walking along the aisle and pulling out each shelf case support.

142. Close case supports.--After the section was completely stocked the employee walked back along the shelves pushing the case supports back under the middle shelf. While the stocking was in progress, if the case supports were closed after each case was stocked it often would be necessary to pull them out again.

143. Set empty containers on floor.--In some instances the empty container was set on the floor after the merchandise was shelved.

144. Tear and place container on rack of truck.--The case was broken down by tearing the four corners and folding. Then it was placed in the rack on the stocking truck.

145. Obtain case from stock.--This represents obtaining the case from segregated stacks and placing it on a 4-wheel platform truck.

146. Move loaded hand truck to storeroom.--As soon as the cases were on the truck the operator wheeled it to the storeroom.

147. Climb into trailer.---(This element is self-explanatory.)

148. Descend to ground from trailer.---(Self-explanatory.)

149. Dismantle conveyor.--This element included the time to remove those sections of the conveyor and stands that were used to receive the grocery order but were not further used in the subsequent grocery operations of price marking and stocking. The element involved the descent of the man in the trailer to the ground.

150. Rehandle part cases.--This element included pulling out part cases from under shelf or gondola, examining the shelf to determine whether the items would go on it, reconsolidating units that could not be accommodated on the shelf, tearing and disposing or consolidating empty cartons, and transporting them to storeroom.

151. Stamp top layer; dispose of stamp and stamp pad.--This element is identical to element No. 54 except that the stamp and stamp pad are disposed of before the operator places the units on the shelf.

152. Ink stamps.--Ink is poured in a cup over a piece of felt. The stamp is obtained from the set and depressed on the felt. The frequency with which the operation is performed is determined by the number of units stamped and how frequently the stamp is used. The porous rubber tips tend to dry out when not in use.

153. Obtain and position case in stacks; load stack of cases on hand truck.--The case was picked up from its stack location and placed on the hand truck.

Table 18.--Production standard for the receiving operation--5-man former operation in store No. 1

No.:	Element Description	: Total :		: Frequency :		: Weighted element time per case :	
		: element:	: per case :	: Man in:	: Man at :	: 2 men with:	: Man in
:	:	: Minutes:	: Number :	: Minutes:	: Minutes :	: Minutes :	: Minutes :
1	Obtain case and position at	:	:	:	:	:	:
	trailer door	:	1.000	:	0.0688:	--	--
2	Delay of work until hand truckers	:	:	:	:	:	:
	return to trailer	:	.083	:	.0248:	--	--
3	Delay for stacker	:	.015	:	.0140:	--	--
4	Rearrange cases in trailer	:	.011	:	.0034:	--	--
5	Move pallet(s) aside	:	.008	:	.0012:	--	--
6	Pick up case from trailer floor	:	:	:	:	:	:
	and position on ground	:	1.000	:	0.0811:	--	--
7	Help load 2-wheel hand truck 1/	:	.174	:	.0121:	--	--
2	Delay of work until hand truckers	:	:	:	:	:	:
	return to trailer	:	.007	:	.0015:	--	--
8	Delay for man in trailer	:	.056	:	.0070:	--	--
9	Rearrange load on 2-wheel hand	:	:	:	:	:	:
	truck 1/	:	.005	:	.0004:	--	--
10	Slide in trailer fixed so cases	:	:	:	:	:	:
	would slide	:	.017	:	.0091:	--	--
11	Delay while stacker completes	:	:	:	:	:	:
	a load of cases	:	.244	:	--	0.0202	--
12	Load 2-wheel hand truck and	:	:	:	:	:	:
	move to storeroom 1/	:	.348	:	--	.0826	--
13	Unload 2-wheel hand truck in	:	:	:	:	:	:
	storeroom 1/	:	.348	:	--	.0134	--
14	Return empty 2-wheel hand truck	:	:	:	:	:	:
	to trailer 1/	:	.348	:	--	.0660	--
15	Delay at trailer while other	:	:	:	:	:	:
	2-wheel hand truck was loaded	:	.548	:	--	.0402	--

See footnote at end of table.

Continued -

Table 18.--Production standard for the receiving operation--5-man former operation in store No. 1--Continued

No.:	Element Description	: Total :		: Frequency :		: Weighted element time per case	
		: element:	: element:	: per case	: Man in:	: Man at :	: 2 men with: Man in
:	:	: Minutes:	: Number	: Minutes:	: Minutes:	: Minutes:	: Minutes
16 :	Help unload 2-wheel hand truck	:	:	:	:	:	:
:	in storeroom 1/	: 0.0500 :	0.044	:	:	:	: 0.0022
17 :	Place cases in stacks along wall	: .0825 :	1.000	:	:	:	: .0825
18 :	Delay for hand truckers	: .2008 :	.132	:	:	:	: .0265
				:	:	:	:
				: .1112 :	.1112	: .2224	: .1112
				:	:	:	:
Total man-minute per case							
Personal and fatigue allowance (15 percent)							
							: .5560
							: .0834
Standard requirement in man-minute per case							
							: .6394
Standard per hour							
Standard per man-hour							
							470 cases
							94 cases
1/ Average number of units per load, 5.75.							

Table 19.--Production standard for receiving operation--2-man former operation in store No. 2

No.	Element Description	Total		Frequency per case	Weighted element time per case	
		: element:	: time per:		: Man in	: Man in
:	:	: Minutes:	: element:	: Number	: trailer	: store room
:	:	:	:	:	: Minutes	: Minutes
19	Obtain case and stack a 2-wheel	:	:	:	:	:
:	hand truckload on trailer floor:	0.0830	:	1.000	0.0830	--
4	Rearrange cases in trailer	.2184	:	.011	.0024	--
5	Move pallet(s) aside	.1516	:	.008	.0012	--
20	Delay for man with 2-wheel hand	:	:	:	:	:
:	truck	.1452	:	.135	.0196	--
7	Help load 2-wheel hand truck 1/	.0499	:	.196	.0098	--
21	Load 2-wheel hand truck 1/	.0968	:	.196	--	0.0194
22	Wheel 2-wheel hand truck to	:	:	:	:	:
:	store room and unload hand	:	:	:	:	:
:	truck 1/	.2796	:	.196	--	.0548
23	Return to trailer with 2-wheel	:	:	:	:	:
:	hand truck 1/	.1806	:	.196	--	.0354
24	Delay for 2-wheel hand truck to	:	:	:	:	:
:	be loaded	.0869	:	.072	--	.0064
Total man-minutes per case		:	:	:	:	:
Personal and fatigue allowance (15 percent)		:	:	:	.1160	.1160
Standard requirement in man-minute per case		:	:	:	:	:
Standard per hour		:	:	:	:	.2320
Standard per man-hour		:	:	:	:	.0348
Average number of units per load, 5.09.		:	:	:	:	.2668
		:	:	:	:	450 cases
		:	:	:	:	225 cases

Table 21.--Production standard for the receiving operation using a wheel-type conveyor--2-man
Improved operation in stores No. 2 and No. 3

No.:	Element	: Total :		Frequency		Weighted element time per case	
		: element:	: time per:element occurs:	: per case :	: Man in :	: Man in :	: storeroom
:	Description	: Minutes:	: Number	: Minutes	: trailer	: Minutes	:
29 :	Install conveyor	: 0.4533 :	: 0.006 :	: 0.0014 :	: 0.0014 :	: 0.0014 :	
30 :	Pick up case; place on conveyor	: .0723 :	: 1.000 :	: .0723 :	: .0723 :	: -- :	
4 :	Rearrange cases in trailer	: .2184 :	: .011 :	: .0024 :	: .0024 :	: -- :	
5 :	Move pallet(s) aside	: .1516 :	: .008 :	: .0012 :	: .0012 :	: -- :	
31 :	Remove case from conveyor and move to :	: .0723 :	: 1.000 :	: -- :	: -- :	: .0723 :	
32 :	stack	: .0878 :	: .041 :	: -- :	: -- :	: .0036 :	
149 :	Delay for merchandise from trailer	: .3455 :	: .003 :	: .0005 :	: .0005 :	: .0005 :	
	Dismantle conveyor	:	:	:	: .0778 :	: .0778 :	
		:	:	:	:	:	
	Total man-minute per case	:	:	:	:	: .1556 :	
	Personal and fatigue allowance (15 percent)	:	:	:	:	: .0233 :	
		:	:	:	:	:	
	Standard requirement in man-minute per case	:	:	:	:	: .1789 :	
		:	:	:	:	:	
	Standard per hour	:	:	:	:	: 670 cases	
	Standard per man-hour	:	:	:	:	: 335 cases	

Table 23.--Production standard for the receiving operation using wheel-type conveyor--3-man crew

No.	Element Description	Total time per element:		Frequency per case:		Weighted element time per case	
		Minutes:	Number	Man in trailer	Man in storeroom	Minutes	Minutes
29	Install conveyor	: 0.4533 :	0.006	: 0.0014 :	: 0.0014 :	0.0014	
30	Pick up case; place on conveyor	: 0.0620 :	1.000	: 0.0620 :	: -- :	--	
4	Rearrange cases in trailer	: .2184 :	.011	: .0024 :	: -- :	--	
5	Move pallet(s) aside	: .1516 :	.008	: .0012 :	: -- :	--	
31	Remove case from conveyor and move to stack	: .1240 :	1.000	: -- :	: .1240 :	.1240	
36	Delay for merchandise from trailer	: .1960 :	.045	: -- :	: .0088 :	.0088	
149	(2 men) Dismantle conveyor	: .3455 :	.003	: .0004 :	: .0006 :	.0006	
				: .0674 :	: .1348 :	.1348	
Total man-minute per case							: .2022
Personal and fatigue allowance (15 percent)							: .0303
Standard requirement in man-minute per case							: .2525
Standard per hour							774 cases
Standard per man-hour							258 cases

Table 25.--Production standard for the former price-marking operation with the flip-board table

No.	Element Description	Total		Frequency		Weighted time per element occurs:		element time per case	per case
		Minutes	Number	per case	Number	Minutes	Minutes		
37	Obtain case from stock (2-wheel hand truck)	0.2600	1.000	:	1.000	:	0.2600	:	0.2600
38	Position case on stamping table (former method)	0.0684	1.000	:	1.000	:	0.0684	:	0.0684
39	Open case; dispose of top (former method)	1.538	1.000	:	1.000	:	1.538	:	1.538
40	Check on price of item	1.744	.437	:	.437	:	0.762	:	0.762
41	Obtain and adjust band-type stamp; obtain stamp pad	1.979	.833	:	.833	:	1.648	:	1.648
42	Obtain band-type stamp and stamp pad	0.392	.167	:	.167	:	0.065	:	0.065
43	Stamp top layer; dispose of stamp and stamp pad 1/	1.523	1.000	:	1.000	:	1.523	:	1.523
44	Flip case and remove carton (former method)	1.024	.690	:	.690	:	0.707	:	0.707
45	Obtain stamp and stamp pad; price mark bottom layer;			:		:		:	
	dispose of stamp and stamp pad 2/	1.613	.690	:	.690	:	1.113	:	1.113
46	Replace carton and flip case (former method)	1.242	.690	:	.690	:	0.857	:	0.857
47	Dispose of case to floor	0.608	1.000	:	1.000	:	0.608	:	0.608
48	Change blade in cutter	4.200	.008	:	.008	:	0.034	:	0.034
49	Ink stamp pad	3.200	.024	:	.024	:	0.077	:	0.077
Total man-minutes per case				:		:		:	1.2216
Personal and fatigue allowance (15 percent)				:		:		:	1.832
Standard requirement in man-minutes per case				:		:		:	1.4048
Standard per man-hour				:		:		:	43 cases

1/ Average number of units per top layer (including single-layer cases), 15.7.

2/ Average number of units per bottom layer (69 percent of all cases), 14.8.

Table 26.--Production standard for the improved price-marking operation with the flip-board table

Element		Total	Frequency	Weighted
No.	Description	:time per:element	occurs:element	time
:	:	: element:	per case :	per case :
:	:	: Minutes:	Number :	Minutes :
50	Obtain case from stock (conveyor)	: 0.0930 :	1.000	: 0.0930
51	Position case on price-marking table (improved method)	: .0466 :	1.000	: .0466
52	Open case; dispose of top (improved method)	: .1119 :	1.000	: .1119
41	Obtain and adjust band-type stamp; obtain stamp pad	: .1649 :	.156	: .0257
53	Obtain stamp and stamp pad	: .0365 :	.844	: .0308
54	Stamp top layer $\frac{1}{2}$: .0942 :	1.000	: .0942
55	Flip case and remove carton	: .0574 :	.690	: .0396
56	Stamp bottom layer, dispose of stamp, and stamp pad $\frac{2}{2}$: .1066 :	.690	: .0736
57	Replace carton and flip case	: .0847 :	.690	: .0584
58	Dispose of case to stocking truck	: .0467 :	1.000	: .0467
48	Change blade in cutter	: .4200 :	.008	: .0034
49	Ink stamp pad	: .3200 :	.024	: .0077
59	Position stocking truck	: .0950 :	.029	: .0028
60	Switch stocking trucks	: .4800 :	.007	: .0034
Total man-minute per case				: .6578
Personal and fatigue allowance (15 percent)				: .0957
Standard requirement in man-minute per case				: .7335
Standard per man-hour				: .82 cases
$\frac{1}{2}$ Average number of units per top layer (including single-layer cases), 15.7.				
$\frac{2}{2}$ Average number of units per bottom layer (69 percent of all cases), 14.9.				

Table 27.--Production standard for the former price-marking operation when units of the top layer are removed to stamp the bottom layer

No.	Element Description	Total		Frequency		Weighted	
		time per element occurs		element		element time	
		element	per case	per case	per case	per case	per case
		Minutes	Number	Minutes	Number	Minutes	Number
37 :	Obtain case from stock (2-wheel hand truck)	0.2600	1.000	0.2600	1.000	0.2600	1.000
38 :	Position case on stamping table (former method)	0.684	1.000	0.684	1.000	0.684	1.000
39 :	Open case; dispose of top (former method)	1.538	1.000	1.538	1.000	1.538	1.000
40 :	Check on price of item	1.744	437	1.744	437	0.762	1.000
41 :	Obtain and adjust band-type stamp; obtain stamp pad	1.979	833	1.979	833	1.649	1.000
42 :	Obtain band-type stamp and stamp pad	0.392	1.67	0.392	1.67	0.065	1.000
43 :	Stamp top layer; dispose of stamp and stamp pad 1/	1.523	1.000	1.523	1.000	1.523	1.000
61 :	Remove top layer of case 1/	1.837	690	1.837	690	1.268	1.000
45 :	Obtain stamp and stamp pad; price mark bottom layer; dispose of stamp and stamp pad 2/	1.687	690	1.687	690	1.164	1.000
62 :	Replace units of top layer 1/	2.088	690	2.088	690	1.441	1.000
47 :	Dispose of case to floor	0.608	1.000	0.608	1.000	0.608	1.000
48 :	Change blade in cutter	4.200	008	4.200	008	0.034	1.000
49 :	Ink stamp pad	3.200	024	3.200	024	0.077	1.000
Total man-minutes per case						1.3413	
Personal and fatigue allowance (15 percent)						0.2012	
Standard requirement in man-minutes per case						1.5425	
Standard per man-hour							39 cases
1/ Average number of units per top layer (including single-layer cases), 15.7.							
2/ Average number of units per bottom layer (69 percent of all cases), 14.8.							

Table 28.--Production standard for the improved price-marking operation when units are removed to stamp the bottom layer

No.	Element Description	: Total :		: Frequency :		: Weighted :	
		: time per:		: element occurs:		: element time :	
		: element:		: per case :		: per case :	
		: Minutes:		: Number :		: Minutes :	
50	: Obtain case from stook (conveyor)	: 0.0930 :		: 1.000 :		: 0.0930 :	
51	: Position case on price-marking table (improved method)	: 0.466 :		: 1.000 :		: 0.466 :	
52	: Open case; dispose of top (improved method)	: .1119 :		: 1.000 :		: .1119 :	
41	: Obtain and adjust band-type stamp; obtain stamp pad	: .1649 :		: .156 :		: .0257 :	
53	: Obtain stamp and stamp pad	: 0.365 :		: .844 :		: .0308 :	
54	: Stamp top layer $\frac{1}{2}$: .0942 :		: 1.000 :		: .0942 :	
63	: Remove two rows of units from top layer, stamp exposed units in bottom layer, move other units in top layer	: :		: :		: :	
:	: aside, stamp exposed units, dispose of stamp and stamp pad, and replace units in case $\frac{2}{2}$: .3885 :		: .690 :		: .2545 :	
58	: Dispose of case to stocking truck	: 0.467 :		: 1.000 :		: .0467 :	
48	: Change blade in cutter	: .4200 :		: .008 :		: .0034 :	
49	: Ink stamp pad	: .3200 :		: .024 :		: .0077 :	
59	: Position stocking truck	: .0950 :		: .029 :		: .0028 :	
60	: Switch stocking trucks	: .4900 :		: .007 :		: .0034 :	
Total man-minute per case		:		:		: .7207 :	
Personal and fatigue allowance (15 percent)		:		:		: .1081 :	
Standard requirement in man-minute per case		:		:		: .8288 :	
Standard per man-hour		:		:		:	
						72 cases	

$\frac{1}{2}$ Average number of units per top layer (including single-layer cases), 15.7.
 $\frac{2}{2}$ Average number of units per bottom layer (69 percent of all cases), 14.8.

Table 29.--Production standard for the former price-marking operation when the flip-board table was moved to the merchandise stacks

No.	Element Description	: Total :		: Frequency :		: Weighted	
		: time per element occurs:		: element:		: per case	
:	:	: Minutes:		: Number :		: Minutes :	
		:		:		:	
64 :	Obtain case from stacks and position on flip-board table:	0.0510 :	1.000 :	0.0510 :	0.0510 :	0.0510 :	0.0510 :
39 :	Open case; dispose of top (former method)	: .1538 :	1.000 :	: .1538 :	1.000 :	: .1538 :	1.000 :
40 :	Check on price of item	: .1744 :	.437 :	: .1744 :	.437 :	: .1744 :	.437 :
41 :	Obtain and adjust band-type stamp; obtain stamp pad	: .1979 :	.833 :	: .1979 :	.833 :	: .1979 :	.833 :
42 :	Obtain band-type stamp and stamp pad	: .0392 :	.167 :	: .0392 :	.167 :	: .0392 :	.167 :
43 :	Stamp top layer; dispose of stamp and stamp pad $\frac{1}{2}$: .1523 :	1.000 :	: .1523 :	1.000 :	: .1523 :	1.000 :
44 :	Flip case and remove carton (former method)	: .1024 :	.690 :	: .1024 :	.690 :	: .1024 :	.690 :
45 :	Obtain stamp and stamp pad; price mark bottom layer; dispose of stamp and stamp pad $\frac{2}{2}$: .1613 :	.690 :	: .1613 :	.690 :	: .1613 :	.690 :
46 :	Replace carton and flip case (former method)	: .1242 :	.690 :	: .1242 :	.690 :	: .1242 :	.690 :
65 :	Dispose of case to stacks or to stocking truck	: .0608 :	1.000 :	: .0608 :	1.000 :	: .0608 :	1.000 :
48 :	Change blade in cutter	: .4200 :	.008 :	: .4200 :	.008 :	: .4200 :	.008 :
49 :	Ink stamp pad	: .3200 :	.024 :	: .3200 :	.024 :	: .3200 :	.024 :
59 :	Position stocking truck	: .0950 :	.029 :	: .0950 :	.029 :	: .0950 :	.029 :
60 :	Switch stocking trucks	: .4800 :	.007 :	: .4800 :	.007 :	: .4800 :	.007 :
66 :	Move salvage container	: .1100 :	.015 :	: .1100 :	.015 :	: .1100 :	.015 :
67 :	Move flip-board table	: .1272 :	.103 :	: .1272 :	.103 :	: .1272 :	.103 :
68 :	Move stock truck	: .3200 :	.016 :	: .3200 :	.016 :	: .3200 :	.016 :
Total man-minute per case						: .9703 :	
Personal and fatigue allowance (15 percent)						: .1455 :	
Standard requirement in man-minutes per case						: 1.1158 :	

54 cases

Average number of units per top layer (including single-layer cases), 16.7.
Average number of units per bottom layer (69 percent of all cases), 14.8.

Table 30.--Production standard for the improved price-marking operation when the flip-board table is moved to the merchandise stacks

No.	Element Description	Total		Frequency		Weighted	
		time per element	occurs	per case	element time	per case	per case
:	:	Minutes:	Number	:	Minutes	:	Minutes
69	: Obtain case from stack and position on flip-board table	: 0.0510	: 1.000	:	: 0.0510	:	: 0.0510
62	: Open case; dispose of top (improved method)	: .1119	: 1.000	:	: .1119	:	: .1119
41	: Obtain and adjust band-type stamp; obtain stamp pad	: .1649	: .156	:	: .0257	:	: .0257
53	: Obtain stamp and stamp pad	: .0365	: .844	:	: .0308	:	: .0308
54	: Stamp top layer 1/	: .0942	: 1.000	:	: .0942	:	: .0942
55	: Flip case and remove carton	: .0574	: .690	:	: .0396	:	: .0396
56	: Stamp bottom layer; dispose of stamp, and stamp pad 2/	: .1066	: .690	:	: .0736	:	: .0736
57	: Replace carton and flip case	: .0847	: .690	:	: .0584	:	: .0584
58	: Dispose of case to stocking truck	: .0390	: .556	:	: .0217	:	: .0217
70	: Dispose of case to stacks	: .0399	: .444	:	: .0177	:	: .0177
48	: Change blade in cutter	: .4200	: .008	:	: .0034	:	: .0034
49	: Ink stamp pad	: .3200	: .024	:	: .0077	:	: .0077
59	: Position stocking truck	: .0950	: .029	:	: .0028	:	: .0028
60	: Switch stocking trucks	: .4800	: .007	:	: .0034	:	: .0034
66	: Move salvage container	: .1100	: .016	:	: .0016	:	: .0016
67	: Move flip-board table	: .1272	: .103	:	: .0131	:	: .0131
68	: Move stock truck	: .3200	: .016	:	: .0051	:	: .0051
Total man-minute per case							: .5617
Personal and fatigue allowance (15 percent)							: .0843
Standard requirement in man-minute per case							: .6460
Standard per man-hour							: 93 cases

1/ Average number of units per top layer (including single-layer cases), 15.7.
2/ Average number of units per bottom layer (69 percent of all cases), 14.8.

Table 31.--Production standard for the former price-marking operation when all 2-layer cases are out in half

No. :	Element Description	Total : time per:element occurs:element time	Frequency : per case :	Weighted per case
:	:	: element: Minutes:	Number	Minutes
37 :	Obtain case from stock (2-wheel hand truck)	: 0.2600 :	1.000	: 0.2600
71 :	Position case on table	: .0684 :	1.000	: .0684
39 :	Open case; dispose of top (former method)	: .1538 :	.310	: .0477
72 :	Cut case in half and separate halves (former method)	: .1971 :	.690	: .1360
40 :	Check on price of item	: .1744 :	.437	: .0762
41 :	Obtain and adjust band-type stamp; obtain stamp pad	: .1979 :	.833	: .1649
42 :	Obtain band-type stamp and stamp pad	: .0392 :	.167	: .0065
73 :	Stamp merchandise; dispose of stamp and stamp pad (former method) 1/	: .2564 :	1.000	: .2564
47 :	Dispose of case to floor	: .0608 :	.310	: .0188
74 :	Move two (one-half) cases to floor	: .1278 :	.690	: .0882
48 :	Change blade in cutter	: .4200 :	.008	: .0034
49 :	Ink stamp pad	: .3200 :	.024	: .0077
Total man-minutes per case				: 1.1342
Personal and fatigue allowance (15 percent)				: .1701
Standard requirement in man-minutes per case				: 1.3043

Table 52.--Production standard for the improved price-marking operation when 2-layer cases are out in half

No. :	Element Description	: Total :		: Frequency :		: Weighted	
		: element:	: element:	: per case	: per case	: time per element	: time per case
:	:	: Minutes:	: Minutes:	: Number	: Number	: Minutes	: Minutes
50 :	Obtain case from stock (conveyor)	:	0.0930 :	1.000	:	0.0930	:
52 :	Open case; dispose of top (improved method)	:	.1119 :	.310	:	.0347	:
75 :	Cut case in half (improved method)	:	.1481 :	.690	:	.1022	:
41 :	Obtain and adjust band-type stamp; obtain stamp pad	:	.1649 :	.176	:	.0290	:
53 :	Obtain stamp and stamp pad	:	.0421 :	.644	:	.0271	:
76 :	Stamp merchandise; dispose of stamp and stamp pad 1/	:	.1580 :	1.000	:	.1580	:
58 :	Dispose of case to stocking truck	:	.0467 :	.310	:	.0145	:
77 :	Dispose of two half cases to stocking truck	:	.0984 :	.690	:	.0679	:
48 :	Change blade in cutter	:	.4200 :	.008	:	.0034	:
49 :	Ink stamp pad	:	.3200 :	.024	:	.0077	:
59 :	Position stocking truck	:	.0950 :	.029	:	.0028	:
60 :	Switch stocking trucks	:	.4800 :	.007	:	.0034	:
Total man-minute per case							
Personal and fatigue allowance (15 percent)						.5437	
						.0816	
Standard requirement in man-minute per case						.6253	
Standard per man-hour							96 cases

1/ Average number of units per case--15.7 plus (69 percent times 14.8)--25.9.

Table 33.--Production standard for the former price-marking operation when performed at the shelf

No. :	Element Description	Total :		Frequency :		Weighted	
		time per element occurs:		element time		per case	
:	:	: element:		per case :		per case	
:	:	: Minutes:		Number :		Minutes :	
78 :	Obtain case from stock (load on 2-wheel hand truck)	:	0.1438 :	:	1.000 :	:	0.1438
39 :	Open case; dispose of top (former method)	:	.2006 :	:	1.000 :	:	.2006
41 :	Obtain and adjust band-type stamp; obtain stamp pad	:	.1979 :	:	.833 :	:	.1649
42 :	Obtain band-type stamp and stamp pad	:	.0982 :	:	.167 :	:	.0164
43 :	Stamp top layer; dispose of stamp and stamp pad 1/	:	.1623 :	:	1.000 :	:	.1623
45 :	Obtain stamp and stamp pad; price mark bottom layer;	:	:	:	:	:	:
:	dispose of stamp and stamp pad 2/	:	.1584 :	:	.690 :	:	.1093
48 :	Change blade in cutter	:	.4200 :	:	.008 :	:	.0034
49 :	Ink stamp pad	:	.3200 :	:	.024 :	:	.0077
66 :	Move salvage container	:	.1100 :	:	.015 :	:	.0016
Total man-minute per case		:	:	:	:	:	.8000
Personal and fatigue allowance (15 percent)		:	:	:	:	:	.1200
Standard requirement in man-minute per case		:	:	:	:	:	.9200
Standard per man-hour		:	:	:	:	:	:
		65 cases					

1/ Average number of units per top layer (including single-layer cases), 15.7.

2/ Average number of units per bottom layer (69 percent of all cases), 14.8.

Table 35.--Production standard for the improved receiving, checking the order, and price marking operation using the flip-board table

No. :	Element Description	Total :		Frequency :		Weighted element time per case		Man in :		Man in :		Stamper	
		element:	time per element occurs :	per case	Number	Man in :	trailer storeroom:	Minutes :	Minutes :	Minutes :	Minutes :	Minutes :	Minutes :
29 :	Install conveyor	0.453 :	0.006 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
30 :	Pick up case; place on conveyor	0.0974 :	1.000 :	0.006 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
52 :	Open case; dispose of top (improved method)	1.314 :	1.000 :	0.006 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
81 :	Delay for other members of the crew	1.198 :	0.792 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
82 :	Restack cases in trailer	0.061 :	1.28 :	0.006 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
83 :	Push cases down conveyor	1.268 :	0.050 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
48 :	Change blade in cutter	4.200 :	0.008 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
84 :	Check in and write unit price on the case	1.085 :	1.000 :	0.006 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
85 :	Obtain invoice from shelf	0.825 :	1.14 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
85 :	Dispose of invoice to shelf	0.755 :	1.14 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
83 :	Push cases down conveyor	1.321 :	1.22 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
86 :	Change location	1.058 :	1.06 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
49 :	Ink stamp pad	3.200 :	0.008 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
41 :	Obtain and adjust band-type stamp; obtain stamp pad	1.649 :	1.00 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
53 :	Obtain stamp and stamp pad	0.421 :	0.33 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
87 :	Stamp top layer and dispose of stamp and stamp pad 1/	1.083 :	0.537 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
88 :	Move case to stack or stoking truck	1.001 :	0.828 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
83 :	Push cases down conveyor	1.219 :	1.30 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
41 :	Obtain and adjust band-type stamp; obtain stamp pad	1.649 :	0.087 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :
42 :	Obtain band-type stamp and stamp pad	0.392 :	0.658 :	1.000 :	0.0014 :	-- :	0.0014 :	-- :	-- :	-- :	0.0014 :	-- :	-- :

See footnote at end of table.

Continued -

Table 36.---Production standard for improved receiving, checking in the order, and price marking operation when cases are out in half

No. :	Element Description	Total : element : Minutes :	Frequency per case Number	Weighted element time per case			
				Man in : trailer : : Minutes :	Man in : storeroom : : Minutes :	Man in : Stamper : Minutes :	Man in : Stamper : Minutes :
4 :	Rearrange cases in trailer	0.2184 :	0.011 :	0.0024 :	-- :	-- :	-- :
29 :	Install conveyor	.453 :	.012 :	.0027 :	0.0014 :	0.0014 :	0.0014 :
30 :	Pick up case; place on conveyor	.0974 :	1.000 :	.0974 :	-- :	-- :	-- :
52 :	Open case; dispose of top (improved method)	1.314 :	.310 :	.0407 :	-- :	-- :	-- :
75 :	Cut case in half (improved method)	.1491 :	.690 :	.1022 :	-- :	-- :	-- :
48 :	Change blade in cutter	.4200 :	.008 :	.0034 :	-- :	-- :	-- :
83 :	Push cases down conveyor	.1286 :	.056 :	.0072 :	-- :	-- :	-- :
92 :	Move conveyor to new location	.6687 :	.006 :	-- :	.0020 :	.0020 :	.0020 :
86 :	Change location	.1058 :	.106 :	-- :	.0112 :	.0112 :	.0112 :
84 :	Check in and write unit price on case	.1085 :	1.000 :	-- :	.1085 :	.1085 :	.1085 :
85 :	Obtain invoice from shelf	.0825 :	.114 :	-- :	.0094 :	.0094 :	.0094 :
85 :	Dispose of invoice to shelf	.0755 :	.114 :	-- :	.0086 :	.0086 :	.0086 :
88 :	Move case to stack or stoking truck	.1001 :	.927 :	-- :	.0928 :	.0928 :	.0928 :
93 :	Move stoking truck aside and obtain empty truck	.1600 :	.008 :	-- :	.0013 :	.0013 :	.0013 :
83 :	Push cases down conveyor	.1321 :	.122 :	-- :	.0161 :	.0161 :	.0161 :
41 :	Obtain and adjust band-type stamp; obtain stamp pad	.1649 :	.176 :	-- :	-- :	-- :	.0290 :
53 :	Obtain stamp and stamp pad	.0421 :	.644 :	-- :	-- :	-- :	.0271 :
76 :	Stamp merchandise; dispose of stamp and stamp pad 1/	.1680 :	1.000 :	-- :	-- :	-- :	.1680 :
49 :	Ink stamp pad	.3200 :	.024 :	-- :	-- :	-- :	.0077 :

See footnote at end of table.

Continued -

Table 37.--Production standard for the price-marking operation with the flip-board table, using the self-inking price-marking set

No.	Element Description	Total time per element		Frequency per case		Weighted element time per case
		Minutes	Number	Minutes	Number	
50	Obtain case from stock (conveyor)	0.0930	1.000			0.0930
51	Position case on price-marking table (improved method)	0.0466	1.000			0.0466
52	Open case; dispose of top (improved method)	0.1119	1.000			0.1119
94	Obtain self-inking stamp	0.0503	1.000			0.0503
95	Stamp top layer 1/	0.0534	1.000			0.0534
55	Flip case and remove carton	0.0574	0.690			0.0396
96	Stamp bottom layer and dispose of stamp 2/	0.0691	0.690			0.0470
57	Replace carton and flip case	0.0847	0.690			0.0594
58	Dispose of case to stocking truck	0.0467	1.000			0.0467
48	Change blade in cutter	0.4200	0.008			0.0034
152	Ink stamps	0.3200	0.024			0.0077
59	Position stocking truck	0.0950	0.029			0.0028
60	Switch stocking trucks	0.4800	0.007			0.0034
Total man-minute per case						
Personal and fatigue allowance (15 percent)						
Standard requirement in man-minute per case						
Standard per man-hour						
92 cases						

1/ Average number of units per case (including single-layer cases), 15.7.

2/ Average number of units per case (69 percent of all cases), 14.8.

Table 38.--Production for the price-marking operation when all 2-layer cases are out in half, and using the self-inking price-marking set

No.	Element	Total		Frequency		Weighted	
		time per element		occurs		element time	
	Description	element	per case	per case	per case	per case	
		Minutes	Number	Minutes	Number	Minutes	
50	Obtain case from stock (conveyor)	0.0930	1.000	0.0930	1.000	0.0930	
52	Open case; dispose of top (improved method)	.1119	.310	.1119	.310	.0347	
75	Cut case in half (improved method)	.1481	.690	.1481	.690	.1022	
94	Obtain self-inking stamp	.0803	1.000	.0803	1.000	.0503	
97	Stamp merchandise and dispose of stamp 1/	.1010	1.000	.1010	1.000	.1010	
58	Dispose of case to stocking truck	.0467	.310	.0467	.310	.0145	
77	Dispose of two half cases to stocking truck	.0984	.690	.0984	.690	.0679	
48	Change blade in cutter	.4200	.008	.4200	.008	.0034	
152	Ink stamps	.3200	.024	.3200	.024	.0077	
59	Position stocking truck	.0950	.029	.0950	.029	.0028	
60	Switch stocking trucks	.4800	.007	.4800	.007	.0034	
Total man-minute per case						.4809	
Personal and fatigue allowance (15 percent)						.0721	
Standard requirement in man-minute per case						.5530	
Standard per man-hour						108 cases	

1/ Average number of units per case--15.7 plus (69 percent times 14.8)--25.9.

Table 39.--Production standard for the price-marking operation when performed at the shelf, and using the self-linking price-marking set

No. :	Element Description	: Total :		: Frequency :		: Weighted :	
		: time per element occurs :		: element :		: per case :	
:		: Minutes :		: Number :		: Minutes :	
50 :	Obtain case from stock (conveyor) $\frac{1}{2}$ /	: 0.0930 :		: 1.000 :		: 0.0930 :	
52 :	Open case; dispose of top (improved method)	: .1314 :		: 1.000 :		: .1314 :	
98 :	Obtain stamp	: .0691 :		: 1.000 :		: .0691 :	
99 :	Stamp top layer and dispose of stamp $\frac{2}{3}$ /	: .0534 :		: 1.000 :		: .0534 :	
100 :	Pick up stamp and dispose of stamp lower layer	: .0844 :		: .690 :		: .0582 :	
101 :	Return stamp to set	: .0383 :		: 1.000 :		: .0383 :	
48 :	Change blade in cutter	: .4200 :		: .008 :		: .0034 :	
152 :	Ink stamps	: .3200 :		: .024 :		: .0077 :	
66 :	Move salvage container	: .1100 :		: .015 :		: .0016 :	
Total man-minute per case						: .4461 :	
Personal and fatigue allowance (15 percent)						: .0689 :	
Standard requirement in man-minute per case						: .5150 :	
Standard per man-hour						117 cases	

$\frac{1}{2}$ / This element was included to make the operation comparable with the other price-marking systems. It consisted of obtaining the case from the stack and placing it on a 4-wheel stacking truck.

$\frac{2}{3}$ / Average number of units per top layer (including single-layer cases), 15.7.

$\frac{3}{3}$ / Average number of units per bottom layer (69 percent of all cases), 14.8.

Table 40.--Production standard for moving merchandise to the shelf location, using the 2-wheel hand truck

No.	Element Description	Total		Frequency		Weighted	
		time per element		occurs		element time	
		element	Minutes	per case	Number	per case	Minutes
102	Search for and obtain hand truck		0.2306	0.019			0.0044
9	Rearrange load on 2-wheel hand truck		.1183	.006			.0007
103	Position hand truck at stack and load		.0692	.179			.0124
104	Move truck to shelf location 1/		.5089	.179			.0911
105	Unload hand truck at shelf location 1/		.1095	.179			.0196
106	Move stocking truck aside		.1988	.019			.0038
107	Return to storeroom with truck 1/		.3793	.179			.0679
Total man-minute per case							.1999
Personal and fatigue allowance (15 percent)							.0300
Standard requirement in man-minute per case							.2299
Standard per man-hour							261 cases
1/ Average number of units per load, 5.6.							

Table 41.--Production standard for moving merchandise to the shelf location, using the 4-wheel stocking truck

No.	Element Description	Total time per element occurs		Frequency per case		Weighted element time per case	
		element	Minutes	Number	Minutes	Minutes	Minutes
102	Search for and obtain hand truck						
9	Rearrange load on 2-wheel hand truck		0.2306	0.019		0.0044	
104	Move truck to shelf location $\frac{1}{2}$.1183	.006		.0007	
106	Move stocking truck aside		.7871	.062		.0488	
107	Return to storeroom with truck $\frac{1}{2}$.1988	.019		.0038	
			.4242	.062		.0263	
Total man-minute per case							.0840
Personal and fatigue allowance (15 percent)							.0126
Standard requirement in man-minute per case							.0966
Standard per man-hour							

621 cases

$\frac{1}{2}$ Average number of units per truck, 16.0.

Table 42.--Production standard for the usual shelf stocking operation--conventional-type shelving

No.	Element Description	Total		Frequency		Weighted	
		time per element occurs		per case		element time	
		Minutes	Number	per case	Number	per case	Minutes
<u>Obtain Merchandise for stockings</u>							
102	Obtain for and obtain hand truck	0.2306	0.019				0.0044
103	Obtain and position case in stacks; load stack of cases on hand truck	.0597	1.000				.0597
108	Move cases aside to obtain merchandise	.1603	.053				.0086
104	Move truck to shelf location 1/	.5089	.179				.0911
105	Unload hand truck at shelf location 1/	.1096	.179				.0196
107	Return to storeroom with truck 1/	.3793	.179				.0679
111	Pre-position case at shelf	.1053	.532				.0560
110	Move case on basket to shelf location	.1221	.133				.0162
109	Spot cases at shelf	.1901	.551				.1104

Miscellaneous shelf elements:

113	Rearrange old merchandise on shelf	.5689	.340				.1934
112	Inspect shelf to see what items are needed	.2468	.117				.0289
115	Place cardboard separators between layers on shelf	.1848	.053				.0098
116	Repair label on item	.5800	.010				.0058
117	Reposition case at shelf	.1248	.006				.0006
118	Obtain and position salvage carton	.2736	.011				.0030
119	Remove items to rotate stock	.5691	.032				.0182
120	Replace items after rotation	.6656	.032				.0213
123	Sit on case to stock bottom shelf	.1920	.005				.0010
124	Face merchandise on shelf after stocking	.5971	.037				.0221
125	Rearrange merchandise on entire section of shelving	5.5700	.005				.0278
126	Fix price tags	.1360	.023				.0035
9	Rearrange load on 2-wheel hand truck	.1133	.006				.0007
106	Move stocking truck aside	.1988	.019				.0038

See footnote at end of table.

Continued -

Table 42.--Production standard for the usual shelf stocking operation--conventional-type shelving--
Continued

No. :	Element Description	Total :		Frequency :		Weighted time per element occurs :		element time per case :	
		Minutes :	Number :	Minutes :	Number :	Minutes :	Number :	Minutes :	Number :
127 :	Obtain dustster to clean shelf	1.0000 :	0.005 :					0.0050 :	
114 :	Clean shelf	1.1512 :	.021 :					.0032 :	
<u>Dispose empty containers:</u>									
128 :	Lay aside empty cartons	.0747 :	.266 :					.0199 :	
129 :	Tear and dispose of carton	1.502 :	.335 :					.0503 :	
130 :	Move salvage box	.2816 :	.013 :					.0037 :	
131 :	Consolidate empty cartons	.0906 :	.521 :					.0472 :	
132 :	Take empty cartons to storeroom	1.503 :	.058 :					.0087 :	
133 :	Dispose of salvage in storeroom	.4707 :	.058 :					.0273 :	
<u>Handle part cases of merchandise:</u>									
134 :	Move full case under shelf	.1785 :	.016 :					.0029 :	
135 :	Place part case under the shelf	1.578 :	.255 :					.0402 :	
136 :	Consolidate units of several part cases in one carton	.3623 :	.165 :					.0598 :	
137 :	Rearrange part cases under shelf	.3710 :	.016 :					.0059 :	
150 :	Rehandle part cases	.3173 :	.271 :					.0860 :	
<u>Shelving:</u>									
138 :	Shelving units 2/	1.1733 :	1.000 :					1.1733 :	
<u>Total man-minutes per case</u>									
<u>Personal and fatigue allowance (15 percent)</u>									
<u>Standard requirement in man-minutes per case</u>									
<u>Standard per man-hour</u>									
1/	Average number of units per truck, 5.6.							23 cases	
2/	Average number of units per case--15.7 plus (69 percent times 14.8)--25.9. Using former methods involving passing units from hand to hand and occasionally using only one hand--one unit at a time.								

Table 43.--Production standard for the improved shelf-stocking operation--conventional-type shelving

No.	Element Description	: Total : : time per:element occurs:element time		: Frequency : : element: per case :		: Weighted : Minutes: Number :		: Minutes	
		:		:		:		:	
	Obtain merchandise for stocking:								
9	Rearrange load on 2-wheel hand truck		0.1183 :		0.006 :		0.0007		
102	Search for and obtain stocking hand truck		: .2806 :		: .019 :		: .0044		
104	Move truck to shelf location $\frac{1}{1}$: .7871 :		: .062 :		: .0498		
107	Return to storeroom with truck $\frac{1}{1}$: .4242 :		: .062 :		: .0263		
121	Position case at shelf		: .1063 :		: 1.000 :		: .1063		
	Miscellaneous stocking elements:								
113	Rearrange old merchandise on shelf		: .5689 :		: .340 :		: .1934		
112	Inspect shelf to see what items are needed		: .2468 :		: .117 :		: .0299		
115	Place cardboard separators between layers on shelf		: .1848 :		: .053 :		: .0098		
116	Repair label on item		: .5800 :		: .010 :		: .0088		
119	Remove items to rotate stock		: .5891 :		: .032 :		: .0182		
120	Replace items after rotation		: .6856 :		: .032 :		: .0213		
124	Face merchandise on shelf after stocking		: .5971 :		: .037 :		: .0221		
125	Rearrange merchandise on entire section of shelving		: 5.5700 :		: .005 :		: .0278		
126	Fix price tags		: .1360 :		: .026 :		: .0035		
140	Take cases from stocking truck and set aside		: .0933 :		: .016 :		: .0015		
127	Obtain dustier to clean shelf		: 1.0000 :		: .005 :		: .0050		
114	Clean shelf		: .1612 :		: .021 :		: .0032		
	Dispose of empty containers:								
143	Set empty containers on floor		: .0434 :		: .394 :		: .0171		
144	Tear and place container on rack of truck		: .1200 :		: .335 :		: .0402		
106	Move stocking truck aside		: .1988 :		: .019 :		: .0038		
	See footnote at end of table.								Continued-

Table 43.--Production standard for the improved shelf-stocking operation--conventional-type shelving--
Continued

No. :	Element Description	: Total :		: Frequency :		: Weighted	
		: element:	: time per:	: element:	: occurs:	: element:	: time
:	:	: Minutes:	: per case :	: Number:	: per case :	: Minutes:	: per case
131 :	Consolidate empty cartons 2/	:	:	:	:	:	:
133 :	Dispose of salvage in storeroom	: 0.2408 :	0.098 :	0.098 :	:	0.0236 :	0.0273 :
	Handle part cases:	: .4707 :	.068 :	.068 :	:	.0273 :	
134 :	Place full case under shelf	: .1786 :	.016 :	.016 :	:	.0029 :	
135 :	Place part case under shelf	: .0798 :	.255 :	.255 :	:	.0201 :	
136 :	Consolidate units of several part cases in one carton	: .2042 :	.165 :	.165 :	:	.0337 :	
137 :	Rearrange part cases under shelf	: .3710 :	.016 :	.016 :	:	.0069 :	
150 :	Rehandle part cases	: .3173 :	.271 :	.271 :	:	.0860 :	
	Shelving of units:						
138 :	Shelving units 3/	: .8780 :	1.000 :	1.000 :	:	.8780 :	
	Total man-minutes per case						1.6646
	Personal and fatigue allowance (15 percent)						.2497
	Standard requirement in man-minutes per case						1.9143
	Standard per man-hour						31 cases

1/ Average number of units per truck, 16.0.

2/ Average number of units per truck, 4.0.

3/ Average number of units per case--15.7 plus (69 percent times 14.8)--26.9. Using improved methods involving stocking from 2 to 4 units simultaneously with both hands.

Table 44.--Production standard for the improved shelf-stocking operation--conventional-type shelving
(with the leaf-type case support)

No. :	Element Description	: Total :		: Frequency :		: Weighted	
		: time per:element occurs:		: per case :		: element time	
:	:	: element:		: per case :		: per case	
:	:	: Minutes:		: Number :		: Minutes	
:	Obtain merchandise for stocking:	:	:	:	:	:	:
9 :	Rearrange load on 2-wheel hand truck	: 0.1183 :	0.006 :	0.007 :	0.0007	:	:
102 :	Search for and obtain hand truck	: .2306 :	.019 :	.0044 :	.0044	:	:
104 :	Move truck to shelf location $\frac{1}{2}$: .7871 :	.052 :	.0488 :	.0488	:	:
107 :	Return to storeroom with truck $\frac{1}{2}$: .4242 :	.062 :	.0263 :	.0263	:	:
139 :	Position case at shelf (on floor or on shelf case supports)	: .1019 :	1.000 :	.1019 :	.1019	:	:
Miscellaneous stocking elements:							
113 :	Rearrange old merchandise on shelf	: .5689 :	.340 :	.1934 :	.1934	:	:
112 :	Inspect shelf to see what items are needed	: .2468 :	.117 :	.0289 :	.0289	:	:
115 :	Place cardboard separators between layers on shelf	: .1848 :	.053 :	.0098 :	.0098	:	:
116 :	Repair label on item	: .5800 :	.010 :	.0058 :	.0058	:	:
119 :	Remove items to rotate stock	: .5691 :	.032 :	.0182 :	.0182	:	:
120 :	Replace items after rotation	: .6556 :	.032 :	.0213 :	.0213	:	:
124 :	Face merchandise on shelf after stocking	: .5971 :	.037 :	.0221 :	.0221	:	:
125 :	Rearrange merchandise on entire section of shelving	: 5.6700 :	.005 :	.0278 :	.0278	:	:
126 :	Fix price tags	: .1360 :	.026 :	.0035 :	.0035	:	:
140 :	Take cases from stocking truck and set aside	: .0953 :	.016 :	.0015 :	.0015	:	:
141 :	Open case supports	: .3050 :	.013 :	.0040 :	.0040	:	:
127 :	Obtain duster to clean shelf	: 1.0000 :	.005 :	.0050 :	.0050	:	:
114 :	Clean shelf	: .1512 :	.021 :	.0032 :	.0032	:	:
142 :	Close case supports	: .2500 :	.013 :	.0032 :	.0032	:	:
:		:	:	:	:	:	:

See footnote at end of table.

Continued-

Table 44.---Production standard for the improved shelf-stocking operation--conventional-type shelving
(with the leaf-type case support)

Element		Total	Frequency	Weighted
No.	Description	time per element	occurs per case	element time per case
		Minutes	Number	Minutes
Dispose of empty containers:				
143	Set empty containers on floor	: 0.0434 :	0.394	: 0.0171
144	Tear and place container on rack of truck	: .1200 :	.335	: .0402
106	Move stocking truck aside	: .1988 :	.019	: .0038
131	Consolidate empty cartons 2/	: .2408 :	.098	: .0236
133	Dispose of salvage in storeroom	: .4707 :	.058	: .0273
Handle part cases:				
134	Place full case under shelf	: .1785 :	.016	: .0029
135	Place part case under shelf	: .0788 :	.255	: .0201
136	Consolidate units of several part cases in one carton	: .2042 :	.165	: .0337
137	Rearrange part cases under shelf	: .3710 :	.016	: .0059
150	Rehandle part cases	: .3173 :	.271	: .0860
Shelving units:				
138	Shelving units 3/	: .6294 :	1.000	: .6294
Total man-minutes per case				
Personal and fatigue allowance (15 percent)				
Standard requirement in man-minutes per case				
Standard per man-hour				
37 cases				

1/ Average number of units per truck, 16.0.

2/ Average number of units per truck, 4.0.

3/ Average number of units per case--15.7 plus (69 percent times 14.8)--25.9. Using improved methods involving stocking from 2 to 4 units simultaneously with both hands.

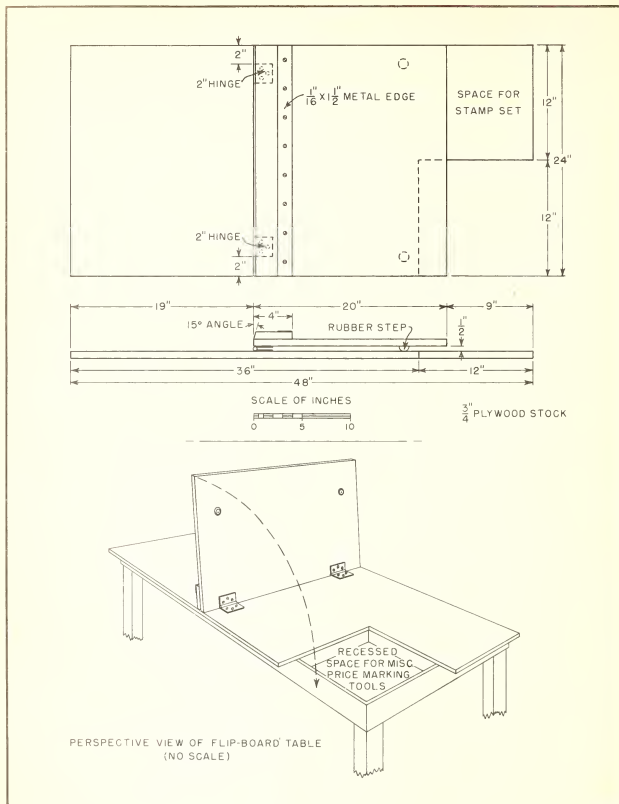


Figure 37.--Detailed view and construction details of flip-board table.



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